5

THE RESERVE RATIO

THE RESERVE RATIO of commercial banks has varied considerably and with important effects on the rate of growth of the money stock. The aggregate reserve ratio is a weighted average of the ratios for individual banks, and fluctuations in the aggregate may reflect either shifts in the distribution of deposits—a change in weights—or changes in the reserve ratios of individual banks. The latter in turn may reflect either changes in reserve requirements or decisions of individual banks to alter their reserve positions. Such decisions can be viewed as one part of the broader decisions banks regularly make concerning the composition of their portfolios. The advantages of certain assets offering a high degree of liquidity and little risk of loss—such as call loans with securities as collateral in an earlier day or Treasury bills today—are balanced against the advantages of less liquid assets providing substantially higher return—such as mortgages or term loans. The desired fraction of cash in the portfolio to provide a margin of safety against future withdrawal of deposits is not the same for every situation and is constantly reappraised in the light of new alternatives and changing circumstances.

Such appraisals are not different in principle from those of individual investors, but there are important practical differences. Banks are subject to legal restrictions on the composition of their portfolios and follow certain well-established practices of commercial banking. In particular, because most of their liabilities are subject to withdrawal on demand or short notice, they need large cash reserves. Nevertheless, changing conditions constantly offer choices between acceptable assets with different qualities and rates of return. Selection depends upon price and quality of alternatives as well as the aforementioned needs for liquidity and safety.

The broad subject of portfolio selection is only touched upon here, but its omission does not appear to hamper the analysis of major fluctuations in the cash reserve ratio. Many of the factors affecting

reserve ratios differ in their influence only as between cash and all other assets and are unrelated to the composition of noncash assets. Two such factors are the distribution of deposits among banks and statutory reserve requirements, both largely unrelated to the response of individual banks to the profitability or liquidity of the noncash portions of portfolios. The first, discussed in section 1, involves shifts in the distribution of deposits between banks with different ratios or between time and demand deposits, which can alter the aggregate ratio even though the ratio for deposits of each kind remains unchanged. In fact, however, those shifts have usually not had important effects.[1] The second factor, requirements imposed by law on reserves, discussed in section 2, has had an important influence on banks' cash holdings.

In addition to the effects of changes in legal reserve requirements, there are other sizable movements in the reserve ratio over both long and short periods. These are discussed in sections 3 and 4. The important factors for long-run movements are various institutional changes in the monetary system that improved stability and lessened the need of banks for cash reserves. The short-run movements are related to the business cycle. In part they may reflect changes in interest rates and in the demand for bank loans, and to that extent involve the noncash assets of banks. On the whole, however, an analysis of these assets is not necessary for interpretation of the major fluctuations in the cash reserve ratio.

1. Shifts in the Distribution of Deposits

Any redistribution of deposits may affect the aggregate reserve ratio. Banks vary in their needs and preferences for high-powered reserves per dollar of deposits, and deposits transferred from one bank to another are not likely to have exactly the same backing as before. Yet random shifts among banks of deposits held by the public probably affect the aggregate ratio very little, except perhaps temporarily while banks adjust. Large sections of the banking system operate under the same legal restrictions, face similar circumstances, and tend as a consequence to maintain roughly the same ratios. Moreover, the effects of many random shifts occurring at the same time tend to cancel out. Large

[1] The reader who wishes to skip the detailed analysis may turn to the summary at the end of sect. 1.

changes in the aggregate ratio are usually produced either by shifts of deposits between sectors of the banking system having appreciably different reserve practices, or by a change in the legal reserve requirements governing a bank because of a change in its legal status, which is equivalent to a shift in deposits between two banks subject to different requirements.

Although not the only source of different reserve ratios, legal requirements are an important one and so provide a convenient basis for classifying the banking system for study of the quantitative importance of shifts in deposits among banks. Reserve requirements differ among types of banks and also, for particular banks, among types of deposits. (1) The required reserve ratio of national or member banks (that is, national banks before the Federal Reserve System and member banks thereafter) has always been considerably higher than that of other commercial banks as a group, which are regulated by widely varying state laws. Banks under state jurisdiction generally have less stringent regulations on high-powered reserves than national or member banks do. (2) Among national or member banks, there is a further difference according to location: Banks in central reserve cities, in other reserve cities, and in country districts are subject to successively lower requirements. Though some state regulations make similar distinctions, the data on state banks do not; consequently, analysis of the redistribution of deposits among banks classified according to their reserve location must be confined to national or member banks. (3) The major difference by type of deposits is the lower requirements imposed on time deposits than on demand deposits by the Federal Reserve System. Prior national banking legislation did not make such a distinction. Many states had modified their laws to impose separate requirements for time and demand deposits even before 1914; most others have since then. In view of this diversity and of the inadequacy of the data, the analysis of the effect of shifts between time and demand deposits is confined to national or member banks. Each of the three kinds of shift is considered in a subsection to follow.

SHIFTS IN DEPOSITS BETWEEN NATIONAL OR MEMBER BANKS AND OTHER COMMERCIAL BANKS

The magnitude and time pattern of such shifts for the period 1875–1955 are shown in Chart 15, by a graph of deposits at national or

CHART 15

Percentage of Commercial Bank Deposits Created by National or Member Banks, Annually and Semiannually, 1875–1955
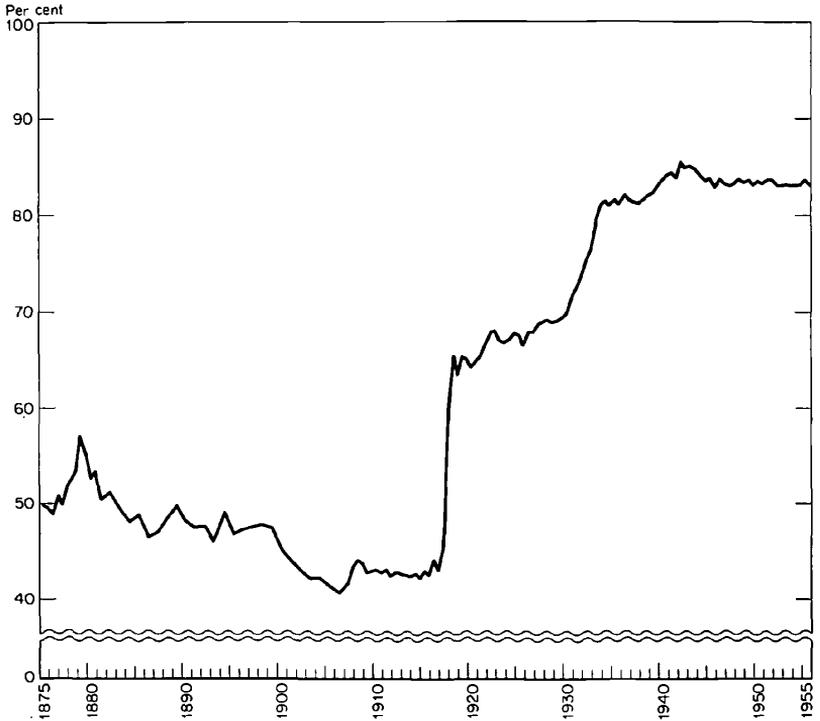
Per cent

Source: Table F-9.

member banks as a percentage of total deposits (except U.S. and inter-bank deposits) at commercial banks.[2] The distribution of deposits between the two classes of commercial banks changed appreciably in only five periods: 1877–79, 1879–86, 1898–1906, 1916–22, and 1929–34. In the first[3] and the last, there was a tendency for national or

[2] The level of this series is slightly too high because lacunae in the data enforced an inexact treatment of balances of mutual savings banks held at commercial banks—the assumption that they are all held at national or member banks. The overstatement in the series on this account is bound to be fairly small, however.

[3] The sharp peak in the series in 1879 apparently reflects the exceptionally large inflows of gold in that year, which were initially deposited in New York City national banks before spreading throughout the banking system, and perhaps also the massive refunding of government debt undertaken in the last years of that decade.

member banks to gain deposits relative to all commercial banks, possibly as a result of severe depressions. A similar movement of more moderate size occurred also during 1887–89, 1893–94, 1907–08, and 1921–22, periods of depressed business, all but the first, severely so. Consistent with this, the relative importance of national banks declined during 1898–1906, a period of general prosperity; that was the time of the spectacular development of loan and trust companies, especially in New York City. The percentage also declined throughout 1879–86, however—a period encompassing both expansion and contraction. There was little variation during most of the mild business cycles or those after 1934.

The shifts in deposits during severe cycles and before the institution of deposit insurance in 1934 seem at first sight to have a simple explanation. Would not the more easily established and less restricted state and private banks multiply in a favorable climate and go under more readily in hard times? Though not all federally supervised banks have weathered such storms without mishaps, they have had to meet certain minimum standards which probably made them stronger than most state and private banks. Evidence for such a difference can be found in figures on bank suspensions.[4] The rate of suspensions was much greater among nonmember than member banks during the early 1930's, and among state and private than among national banks in the panic periods of 1907–08, 1893, and 1873–74.

Yet it seems doubtful that suspensions are the main explanation. Except in 1930–33, they were not sufficiently widespread to account for more than a small part of the redistribution of deposits. Moreover, in two of the periods previously listed in which national banks gained deposits, 1877–79 and 1887–89, all classes of banks were increasing in number. The shift in deposits away from other commercial banks in those two periods, therefore, could not have resulted from suspensions. This phenomenon will receive further examination in the next subsection, which covers the distribution of national or member bank deposits by reserve classification. It is suggested there that the shifts in deposits may reflect a more general shift between large city banks and all others, which could produce the behavior just discussed

[4] For the annual number of suspensions, see *Historical Statistics of the United States, 1789–1945*, Bureau of the Census, 1949, Ser. N135–138; for the total number of banks in each class, see *Banking Studies*, Board of Governors of the Federal Reserve System, 1941, p. 418.

because city banks are heavily represented in the national banking system.

The exceptional rise in the proportion of deposits at national or member banks from 1916 to 1922 reflects a change in federal law. When the act of June 20, 1917, removed certain objectionable features of membership in the Federal Reserve System, a sizable number of state banks joined, most of them immediately, as indicated by the ensuing movement in the series. Although that movement represents a shift in the legal status of banks rather than in the location of depositors' accounts, the effect on the aggregate reserve ratio is the same.

The importance of the shifts can be measured by comparing with the actual ratio a hypothetical reserve ratio, computed as a weighted average of the ratios for the two classes of banks and having constant weights and so assuming no shifts occurred. For the present purpose, the distribution of deposits at the beginning of each period can serve as the constant set of weights. Comparison of the periods having the largest shifts shows the largest effects and so gives a measure of their maximum importance. The results are summarized in Table 16 for the five periods previously identified.

Column 4, which shows changes in the aggregate ratio due to shifts in distribution, is the difference between two weighted averages of the separate reserve ratios for the two classes of banks, the weights in each case being the proportion of total deposits at each class of banks. For one weighted average (column 2) the weights are the actual proportions, and the average equals the actual aggregate reserve ratio. For the other average (column 3) the weights are the proportions at the beginning of the period and are kept constant to its end, so that the average equals the ratio that would have prevailed had no redistribution of deposits occurred between the two classes of banks.

The reserve ratio for each class of banks is defined as the aggregate ratio is for all commercial banks—high-powered reserves to deposits. This is not entirely satisfactory here because such a ratio takes no account of the balances other commercial banks hold at national or member banks: while these balances are not high-powered reserves, they nevertheless affect the amount of such reserves held by both classes of banks. Other commercial banks, being mostly small-town banks, have as a group a larger sum due from than to national or

member banks. Part of the high-powered reserves of national or member banks can therefore be regarded as held by them for other commercial banks. If deposits are shifted from a nonmember to a member bank, for example, part of the otherwise required transfer of high-powered reserves is handled by a reduction in the balances held by the nonmember bank at member banks. In consequence,

TABLE 16

EFFECT ON RESERVE RATIO OF FIVE LARGEST SHIFTS IN DEPOSITS BETWEEN
NATIONAL OR MEMBER BANKS AND OTHER COMMERCIAL BANKS, 1875 TO 1955

Period[a]	Percentage of Commercial Bank Deposits Gained (+) or Lost (-) by National or Member Banks[b] (1)	Numerical Change in Percentage Reserve Ratio of All Commercial Banks		
		Actual[c] (2)	Assuming No Shift in Distribution of Deposits[d] (3)	Due to Shifts in Deposits (2) - (3) (4)
Aug. 1877–Aug. 1879	+8.1	-0.8	-1.4	+0.6
Aug. 1879–June 1886	-11.5	-0.9	+0.3	-1.2
June 1898–June 1906	-7.0	-5.4	-4.6	-0.8
Dec. 1916–June 1922	+24.7	-3.2	-4.9	+1.7
Dec. 1929–June 1934	+12.1	+7.8	+6.3	+1.5

[a]Selected from Chart 15.

[b]Based on Table F-9. This is equivalent to the actual change in deposits at national or member banks minus the expected change on the basis of the actual change in deposits of all commercial banks, expressed as a percentage of deposits at all commercial banks at the end of the period.

[c]From Table F-10, col. 4.

[d]The change in a weighted average of the reserve ratios for national or member banks (Table F-10, col. 2) and for other commercial banks (Table F-10, col. 3), where the weights (given by Table F-9) are those for the beginning of the period. By ignoring net deposits of other commercial banks at national or member banks, the change in col. 4 is slightly understated (see text).

such a shift in deposits will not require so large a reduction in high-powered reserves and hence in deposits of nonmember banks, nor allow so large an increase for member banks, as might be inferred solely from the ratio of high-powered reserves to deposits. That ratio is lower for other commercial banks and higher for national or member banks than the corresponding ratio of all cash reserves, including balances at other banks, to total deposit liabilities, including balances owed to other banks. Hence, use of the ratio of high-powered reserves to deposits held by the public exaggerates the effects of deposit shifts, because it overstates the difference between the reserve positions of the two classes of banks. In computing the appropriate reserve ratio

for each class of banks, for strict accuracy we should reduce the high-powered reserves of national or member banks and increase those of other commercial banks by that amount.

Unfortunately, an accurate adjustment for these interbank balances can not be made, because the net amount due by national or member banks to other commercial banks is not separated from the net amount due to mutual savings banks and foreign commercial banks. Some rough calculations using the data available suggest that this adjustment would enlarge the bottom three figures in column 4 by at most one-half a percentage point in absolute value and leave the top two figures largely unchanged.[5]

Even so, the estimated effect is still relatively small, which indicates that the actual effects account for only a small part of the major movements in the aggregate reserve ratio. In the final three periods represented in the table, during which sizable movements in the reserve ratio accompanied the deposit shifts, the shifts accounted for less than one-fifth of those movements in two periods (beginning in 1898 and 1929) and worked against the prevailing movement in the third (1916–22). In the latter, enlargement of membership in the Federal Reserve System reduced by almost one-third the decline in the aggregate ratio which would otherwise have occurred. In the two earliest periods, the estimated effect of redistribution is almost the same in absolute magnitude as in the other periods. It is, however, large relative to the actual change, which happened to be small. As noted, Chart 15 reveals no other shifts of comparable size, and it seems clear that the effects of shifts other than those listed in Table 16 must have been negligible.

[5] One way to estimate the high-powered reserves (call them T) that national or member banks hold behind the net amounts they owe to other commercial banks (I) is to assume the ratio is the same as for other deposits. If H denotes total high-powered reserves and D deposits held by the nonbanking public, the assumption is that $T/I = (H - T)/D$, which implies that the corrected reserve ratio for national or member banks is $(H - T)/D = H/(D + I)$. The reserves $T(=IH/[D + I])$ are assumed to belong to other commercial banks, and so their high-powered reserves are to be increased by T. An estimate of T requires a figure for I, which we can only approximate. The correction suggested in the text for col. 4 is based on this method.

Since interbank deposits can be highly volatile, banks may hold larger reserves behind them than behind regular deposits. If so, the preceding estimate of T is too small; and, since the reserve ratio for national or member banks is greater than the other, the corrected ratios are further apart than they should be. Hence the correction suggested in the text is likely to be too large in absolute value.

SHIFTS IN DEPOSITS AMONG NATIONAL OR MEMBER
BANKS IN DIFFERENT RESERVE CLASSIFICATIONS

Since a shift in deposits between national or member banks and other commercial banks explains little of the movements in the aggregate reserve ratio, the movements must reflect the behavior of the component ratios (national and nonnational, member and nonmember banks). So far as this finding goes, each component could exhibit movements that do not appear in the aggregate ratio because the other component offsets them. In fact, however, movements in the two have a high degree of correspondence. The correlation coefficient for the period 1875–1955 is 0.67, and omitting the turbulent years 1935–45, the coefficient is 0.84.[6]

The question then arises: Might some of the movements in the reserve ratios for the two classes of banks reflect shifts in deposits among banks according to their location by city size or reserve requirements?[7] The two breakdowns can be examined together for national or member banks, since reserve requirements happen to be imposed on these banks roughly according to the population density of their localities. Central and other reserve cities, in which banks have higher requirements than elsewhere, generally encompass the nation's largest cities. State reserve requirements also vary with the location of banks; for reasons given, however, further examination of shifts in deposits will be confined to those among national or member banks. Because of the high correlation between the ratios for these and other commercial banks, the results for one class probably apply to the other.

To gauge the importance of the shifts, we may compare the actual reserve ratio with one corrected for shifts. The latter may be computed as a weighted average of the ratios for the three classes of national or member banks (central reserve city, reserve city, and country) with weights equal to the proportion of their aggregate deposits at each of the three classes of banks. If the weights are kept constant over a given period, the average is a hypothetical aggregate ratio for these classes assuming no shifts in the relative size of their deposit liabilities. If the true weights are used throughout, the average is the actual

[6] The series correlated were cols. 1 and 3, Table F-10.

[7] Asset size of banks is probably also important, but data for that breakdown are unavailable; the breakdown by class of bank approximates one by asset size, though imperfectly.

CHART 16

Actual and Hypothetical Reserve Ratios and the Difference Between Them, National or Member Banks, Annually, 1875–1955

Source: Tables F-11, F-13, and F-14. Deposits include the net amount owed to nonnational (before 1914) or nonmember (after 1914) commercial banks.
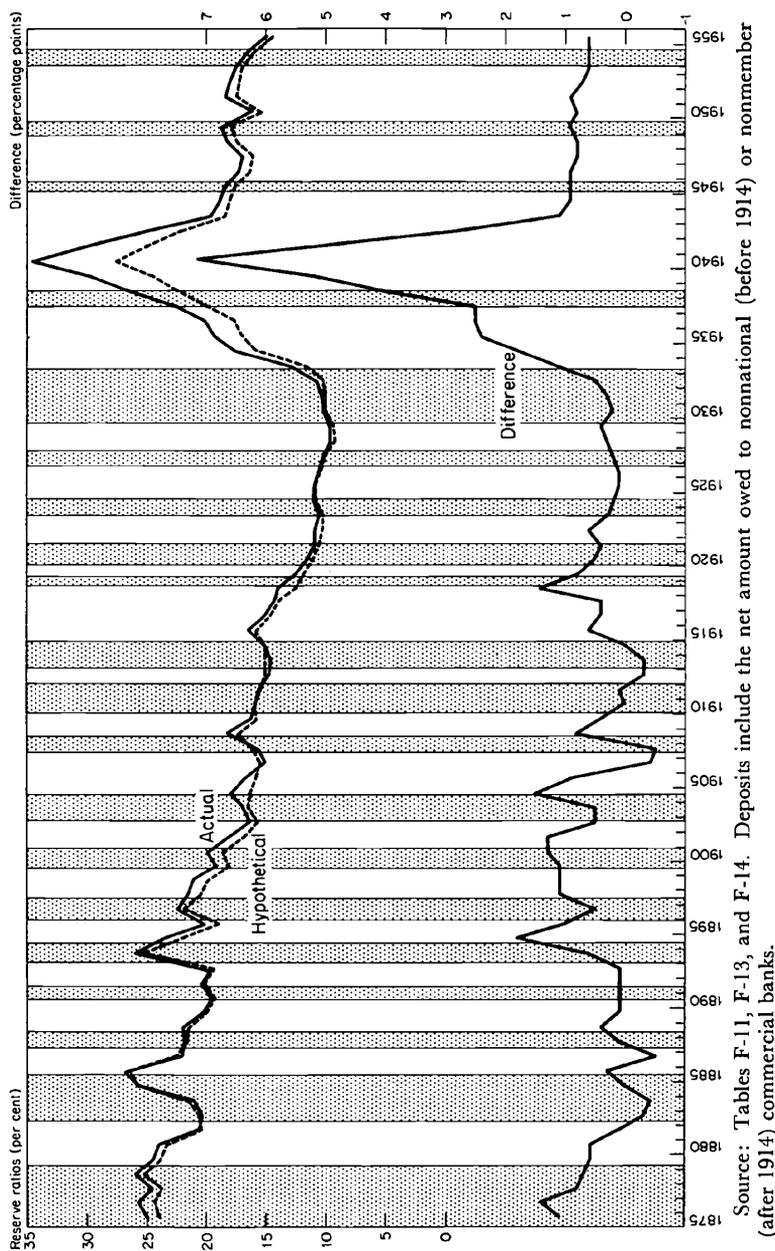
Note: Shaded areas represent reference cycle contractions; unshaded areas, expansions. Hypothetical ratio constructed according to the distribution of deposits among the three classes of national banks in 1914. See notes to Table F-14.

aggregate ratio. The two ratios are plotted in Chart 16. The constant weights for the hypothetical ratio are the distribution of deposits in 1914, the approximate mid-point of the time scale. Differences between the two ratios represent departures from the 1914 distribution of deposits. Between any two dates the approximate effects of redistribution are shown by changes in the gap between the two series, displayed at the bottom of the chart on an enlarged scale.

The reserve ratio in this comparison is defined as the ratio of high-powered reserves to deposits, including in deposits the net amount owed to nonnational (before 1914) or nonmember (after 1914) commercial banks. The inclusion assumes that these interbank deposits have the same fraction of high-powered reserves behind them as regular deposits do (see footnote 5). To have also adjusted each of the three ratios in the hypothetical average ratio for the amount of high-powered reserves held by each class of banks behind their deposits at other national-member banks would be desirable, for reasons given for the components (national and nonnational or member and nonmember) of the commercial bank ratio. Country banks hold balances at central reserve city and reserve city banks, and the latter hold balances at central reserve city banks, which prevent the full adjustment to deposit shifts between classes of these banks from falling on high-powered reserves. Such balances satisfied part of the legal reserve requirements for national or member banks before June 1917. Even since then, such balances have been held voluntarily to facilitate interbank transfer of funds. The adjustment of the three ratios is not feasible, however, in the absence of published figures on the net amounts owed each of the three classes of member banks. The data for member banks, used for the ratios in the chart after 1917, give total interbank deposits due from and to all other banks, including nonmember banks. The data permit estimates of the net amount due to nonmember banks by each class of member banks. That estimate, as noted, is included in the denominator of the reserve ratios. Amounts due to and from other *member* banks by each class, however, cannot be segregated. Though the necessary data were reported before 1917, the adjustment was omitted for the earlier period, as well, to preserve comparability. The size of total interbank deposits indicates that the maximum possible effect of the adjustment would not alter the results significantly, so this omission can be safely ignored in interpreting

Chart 16. If the adjustment could be made, it would reduce the spread between the three ratios slightly and also the estimated effects of redistribution.

The first and more important impression to be gained from Chart 16 is how close together the two series remain over the entire period. Use of the 1914 distribution of deposits throughout for the weights results in an only slight divergence between the two series, even at the beginning and end when the 1914 weights are least likely to apply so well. Since the reserve ratios for the three classes of banks differ considerably in level, the result indicates that shifts in deposits among those classes have been fairly small.

The main divergence between the two series is in 1933–40, when the actual ratio rose 17 percentage points and the hypothetical ratio only 12, a reduction of almost one-third of the increase in the actual ratio. The divergence implies a shift of deposits to the classes of banks with higher reserve ratios, namely, central reserve city and other reserve city banks. Surprisingly enough, most of the divergence came well after the period 1930–34 when, as Table 16 and Chart 15 show, most of the shift in deposits in favor of member banks at the expense of nonmember banks occurred. Part of that shift was tentatively attributed to a high rate of suspensions among small banks. The shift in 1933–40, shown in Chart 16, in favor of reserve city member banks at the expense of country member banks was clearly not due to a wave of suspensions among country banks. Indeed, the number of licensed country member banks increased sharply from 1933 to 1934 and then remained roughly constant through 1940. Obviously, country banks gained less than their usual share of the increase in total deposits. Country banks, of course, deposited most of their excess funds, which typically pile up during business depressions, with correspondent city banks; that transfer shifted the distribution of interbank deposits in that direction. But the figures underlying Chart 16 exclude interbank deposits between member banks, and such transfers from nonmember banks were too small to make much difference.

The major factor accounting for the redistribution was a shift of deposits held by the public to reserve city member banks, the largest shift being to central reserve city banks in New York City. The importance of those banks is shown by the increase in deposits held by

the public from 1933 to 1940 for the various classes of member banks: for country banks the increase was 78 per cent; for noncentral reserve city banks, 84 per cent; for Chicago banks, 88 per cent; and for New York City banks, 114 per cent. The figures indicate that a large share of the cash balances accumulated by the nonbanking public during the 1930's gravitated to New York City. The shift, to be sure, encompassed a small part of the total balances accumulated. The increase in deposits of noncountry member banks in excess of the 78 per cent increase in country member bank deposits—which serves as a basis for comparison—accounted for but 12 per cent of the total increase in member bank deposits, 1933–40. Nevertheless, the effect of that shift on the member bank reserve ratio and thence on the stock of money was striking (see Chart 16).

The difference between the two series in other periods is less pronounced but still revealing in the enlarged scale at the bottom of the chart, which also shows the conformity of the difference series to reference cycles. The difference series typically rises during contractions and falls during expansions, indicating a shift of deposits to city banks when business lags and to country banks when business prospers. Two of the strongest exceptions to that pattern can perhaps be explained by other factors. The rise in the difference series during the 1933–37 reference expansion, just discussed, may have been due to the depressed conditions of the economy throughout that period leading to the usual behavior for contractionary periods. The rise during the 1917–18 inflation reflected the character of the early growth of the Federal Reserve System. Spread of membership to state banks occurred only after 1917. The rise in the difference series after 1917 and its subsequent decline suggest that the first state banks to become member banks swelled the ranks of reserve city banks rather than of country banks and that subsequently the numerical preponderance of new entrants swung the other way.

Despite the exceptions, the cyclical behavior of the difference series exhibits high inverse conformity to cycles. A simple test confirms this. When the items in the series nearest to monthly peaks and troughs of reference cycles are selected and the successive directions of change in the items listed, there are two expansions and two contractions in which there was no change, thirteen out of the remaining sixteen expansions in which the change was downward, and eleven out of the

remaining sixteen contractions in which the change was upward. This count omits the incomplete reference contraction at the beginning of the series but includes every phase thereafter from 1879 to 1954, eighteen reference cycles in all. These results are statistically significant: the 24 "correct" moves in 32 cyclical phases (omitting the four cases of no change) would occur by chance less than 5 per cent of the time. Deposits tended to shift in favor of city banks during contractions and in favor of country banks during expansions with considerable regularity. Such a shift probably accounts for the relative decline of other commercial banks in severe contractions, a phenomenon commented on in the preceding subsection, since those banks are chiefly located in country districts.[8]

An explanation might be that one group of money holders whose cash balances undergo greater cyclical fluctuation than the aggregate does keeps most of its holdings at reserve city banks. Such a group might be large business corporations and financial intermediaries most of which have their main banking connections in large cities.

The largest movements in the difference between the actual and the hypothetical ratio, except during 1933–40 and the subsequent period of return to normal levels, amounted at most to 2 percentage points and even then did not coincide with the major movements in the reserve ratio. In the analysis of the reserve ratio, we can ignore the effects of shifts in deposits among national-member banks in different reserve classifications.

SHIFTS BETWEEN TIME AND DEMAND DEPOSITS

A third change in the distribution of deposits which affects the reserve ratio is shifts between time and demand deposits. The Federal Reserve Act imposed substantially lower reserve requirements on the former than the latter. While the National Bank Act had made no distinction between different kinds of deposits, many state banking statutes did even before 1914. Aside from statutory requirements, banks no doubt view time deposits as needing only small cash reserves.

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[8] The effect of these shifts is to make New York City banks tighter than the rest of the banking system during business expansions, and easier during contractions. Insofar as Federal Reserve countercyclical policy is based on the condition of New York City banks, the policy will, because of the deposit shifts, be too easy for the economy at large during expansions and too tight during contractions.

CHART 17

Ratio of Time to Total Deposits at Commercial Banks, Annually, 1914–60

Per cent
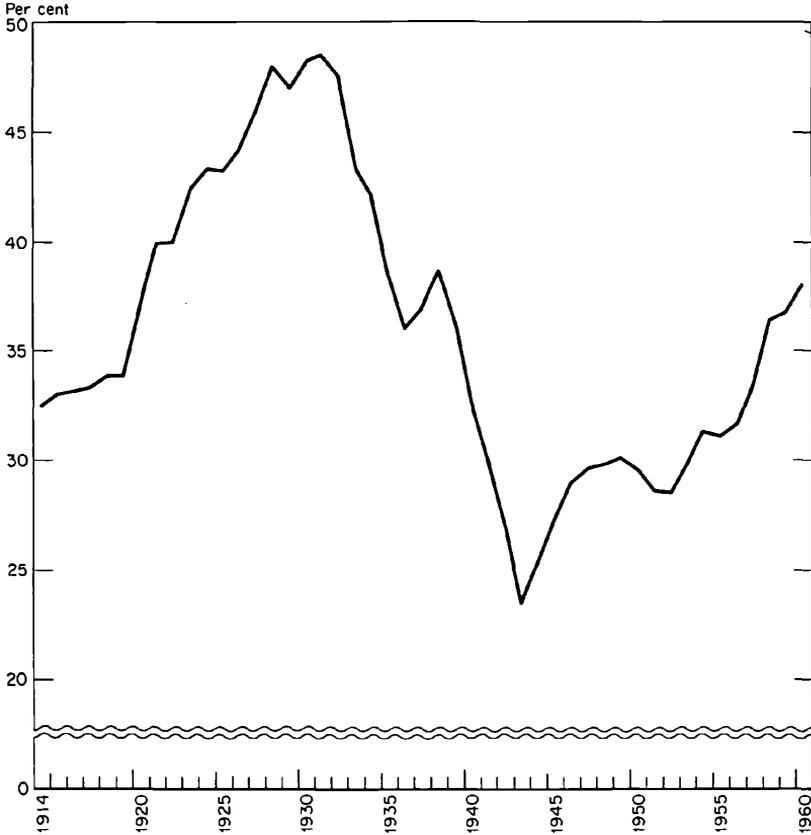
Source: Same as for Chart 2 and Table F-1.

The direction and magnitude of such shifts from 1914 to 1960 is shown by the ratio of time to total deposits at all commercial banks in Chart 17. The ratio rose sharply from 1919 until 1931, then fell with comparable rapidity until 1943, and rose again but more slowly thereafter. After 1956 it rose rapidly. The wide fluctuations in the ratio over those forty-six years has elicited considerable comment. The rise during the 1920's has been attributed to transfers of demand

deposits to the time classification. The rise during the 1950's has been attributed to the growing competition of other financial assets with demand deposits as a form of wealth holding. Side by side these two explanations of different periods point up the main difficulty of interpreting this ratio: movements may reflect a shift between time and demand deposits or between one of them and other financial assets, either of which could be primarily responsible.

A broader perspective on the behavior of time deposits may be obtained by a comparison, not only with demand deposits, but also with a larger group of liquid assets that seem to be especially close substitutes. As a first approximation, we may treat time deposits, at least for recent decades, as almost entirely a repository of long-term savings, in contrast to the use of most checking accounts for current transactions. This is the way banking laws view time deposits. It is the rationale for low reserve requirements and delayed withdrawal privileges. Some evidence that time deposits are in fact mostly long-term savings is that, since at least 1940 and very likely much earlier, virtually all have been classified as savings accounts (restricted by law to individuals and nonprofit institutions) rather than time certificates of deposit. Savings accounts are relatively small in average amount (presumably mostly held by people of moderate means), and they have low turnover compared with demand deposits.[9] Indeed, their turnover is not much above that of savings accounts in other financial institutions. Accordingly, the main substitutes for time deposits, in addition to demand deposits, appear to be U.S. savings bonds and savings accounts at mutual savings banks, savings and loan associations, credit unions, and the Postal Savings System. The cash value of life insurance is sometimes also included, but it seems an altogether different and more distant substitute.

For Chart 18 total liquid assets are defined as the deposit liabilities of the above institutions (excluding insurance companies), plus com-

[9] See "Time and Savings Deposits at Member Banks," *Monthly Review*, Federal Reserve Bank of New York, July 1960, pp. 118–23; *Federal Reserve Bulletin*, April 1958, pp. 422–426; G. Garvy, "The Velocity of Time Deposits," *Journal of American Statistical Association*, June 1953, pp. 176–191; W. R. Burgess, *The Reserve Banks and the Money Market*, New York, 1946, p. 38; and S. Shapiro, "The Distribution of Deposits and Currency in the United States, 1929–1939," *Journal of the American Statistical Association*, Dec. 1943, pp. 438–444. See also W. Welfling, "Some Characteristics of Savings Deposits," *American Economic Review*, Dec. 1940, pp. 748–758.

mercial banks. The chart shows the ratios of time and of demand deposits to that total from 1896 to 1960, as well as to that total plus U.S. savings bonds, separately, introduced in 1935. The figures for time and demand deposits at national banks before 1914 are estimated from reports made to the Comptroller of the Currency;[10] the official call reports of those banks did not require such data. The breakdown between nonnational bank time and demand deposits was reported for only a few states, and the estimates are particularly unreliable before 1909. There was no standard definition of time and savings deposits before 1914, when the Federal Reserve Act defined time deposits at member banks as payable after thirty days. The earlier data apparently include all deposits not payable immediately, and the new definition excluded some previously classified as time deposits. The resulting changes are minor, as the small drop in the ratio in 1914 attests.

A conceptual problem remains, however. Time certificates of deposit, which have fixed maturities and are generally held by businesses or wealthy individuals, were a much larger fraction of total time deposits in the earlier years than they have been since the 1930's. Also, in the 1920's and perhaps earlier, some commercial banks permitted checking against time deposits by the simple device of keeping an extra passbook on hand at the bank and honoring a depositor's written order for payment as a check. The practice was effectively prohibited by the banking acts of 1933 and 1935 by stipulating that savings deposits can be paid only to the depositor or upon presentation of his passbook.[11] Consequently, a sharp distinction between demand and time deposits based on their present characteristics encounters conceptual problems in earlier periods and loses significance. What the closest substitutes for time deposits have been, therefore, may well have changed over the years.

The ratios in the top panel of Chart 18 may be divided into four periods: 1896 to World War I, when the share of time deposits in total liquid assets rose and the share of demand deposit stayed the

[10] See *All-Bank Statistics, United States, 1896–1955,* Board of Governors of the Federal Reserve System, 1959, pp. 18 and 40. It presents a breakdown of time and demand deposits separately for every year back to 1896. Years for which the breakdown is based solely on interpolations have been omitted in Chart 18. Estimates for years before 1907 were based on a survey made by the Comptroller in 1907 and are therefore subject to considerable error.

[11] See *Federal Reserve Bulletin,* Nov. 1938, pp. 969–970; and Mar. 1961, p. 288.

CHART 18

Share of Time Deposits and Demand Deposits in Total Liquid Assets, and Rates of Return, 1896–1960

Per cent

Share of demand deposits

Including savings bonds in liquid assets

Share of time deposits

Including savings bonds in liquid assets

Per cent per year

Mutual savings banks

Savings and loan

Rates of return on deposits or shares

Time

Demand
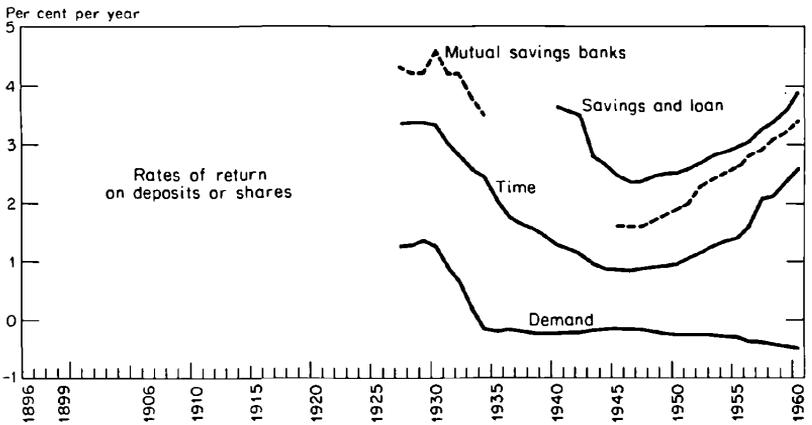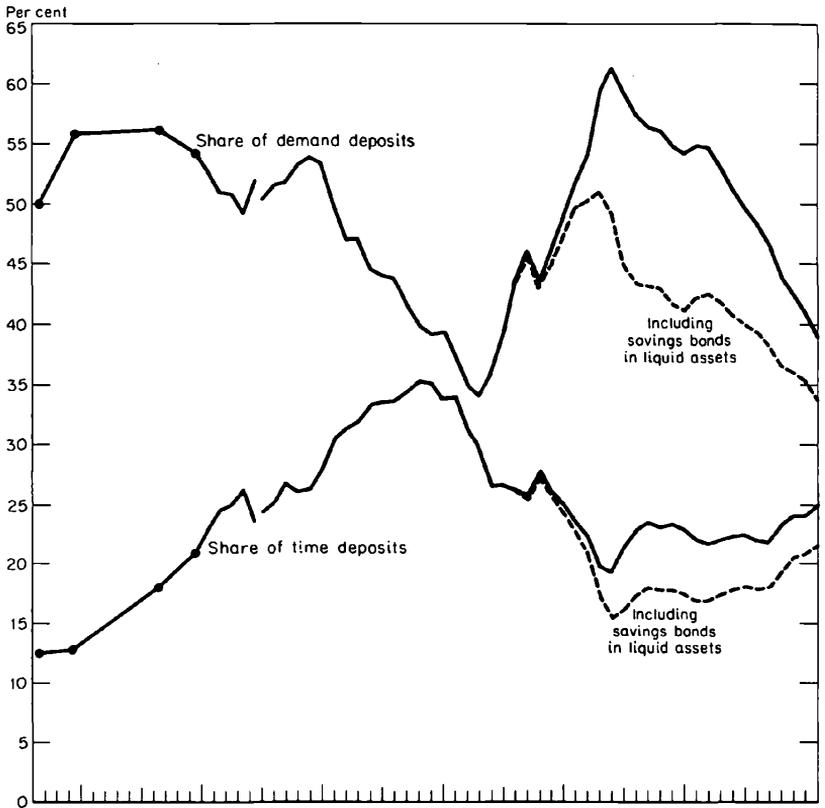
with no mutual savings banks. Indeed, nonnational banks in western states had virtually no increase in time deposits relative to total deposits over the period.

Why nonnational banks had proportionately so much larger time deposits than national banks had, as the table shows, is understandable. As noted, some state reserve requirements were lower for time than for demand deposits even before 1914, giving nonnational banks an

TABLE 17

RATIO OF TIME DEPOSITS TO TOTAL DEPOSITS AT COMMERCIAL
BANKS, SELECTED AREAS, 1896 AND 1914
(per cent)

	1896	1914
States with mutual savings banks		
National banks	3.1	16.9
State and private banks	24.1	31.1
States without mutual savings banks[a]		
National banks	6.6	22.4
State and private banks	45.4	50.1
States west of the Mississippi[b]		
National banks	7.8	22.1
State and private banks	52.0	52.3

Source: Compiled from data in <u>All-Bank Statistics</u>.

[a]Includes District of Columbia.

[b]Excludes Minnesota.

incentive to expand them. Even by 1896, time deposits comprised a third of the total deposits at those banks. What is strange (assuming the data are correct) is that national banks pursued the savings business when they apparently derived no comparable advantage from lower reserve requirements. Perhaps the business became especially profitable and inviting when interest rates on bank assets started to rise around 1904 following a long decline (see Appendix E). National banks could expect to attract—and did—a fair share of that business with the advantage of offering all banking facilities at one place. While the rate of interest paid by commercial banks on deposits appears to have risen after about 1904 (Appendix E), it rose also on mutual savings bank deposits; there is no indication that the differential rate changed appreciably. Apparently there was a ready market for time deposits in the period, and a higher differential rate was not necessary.

Source

same overall; World War I to 1929, when the share of time deposits gained and that of demand deposits declined; 1929 to 1943, when the movements of the preceding period were reversed; and 1943 to 1960, when time deposits rose and demand deposits fell in relative position during the first part and again during the latter part of the period. These movements swamp the small cyclical ripples in the series, which suggests that cyclical shifts among these assets were of minor significance. Let us examine each period in turn.

1896 to World War I. The rise in the share of time deposits occurred mainly at the expense of mutual savings banks, which were then the chief competitor of commercial banks for savings deposits. Since banking spread rapidly through the West, it is tempting to conclude that commercial banks took over much of the savings business in the expanding areas simply because mutual savings banks were not chartered there. Table 17 shows, however, that this explanation is inadequate. The ratio of time to total deposits in commercial banks increased as much from 1896 to 1914 in states with mutual savings banks as in states without them or as in western states as a group,

In any event, demand deposits held their share over the period as a whole and so, on this evidence, do not appear to have been affected by the growth of time deposits.

World War I to 1929. The rising share of time deposits during the 1920's was attributed by an official committee of the Federal Reserve Board to transfer of deposits from the demand to the time classification.[12] Banks had an incentive to encourage such transfers because of the previously mentioned lower reserve requirements for time deposits. Allegedly, national banks were the chief culprits, since some state member banks operated under such differences in reserve requirements earlier. Banks supposedly induced depositors with large checking accounts to hold part of their funds in time accounts at higher rates of interest.[13] Although the differential rate on time over demand deposits appears not to have risen, depositors may still have been willing to make such transfers on assurance that the funds were safe and readily accessible when needed. The advent of the Federal Reserve System seemed to enhance the ability of banks to avoid those stringencies which previously had delayed the payment of time (and demand) deposits.

The view is plausible that some growth of time deposits was at the expense of demand deposits because of the above-mentioned legal changes. Time deposits in national banks grew from a much lower level and more rapidly relative to demand deposits during the 1920's than they grew in nonnational banks. According to Chart 18, the share of total demand deposits fell from 1914 to 1929 (ignoring the temporary rise during World War I) just over 10 percentage points, almost exactly the amount the share of total time deposits rose. Yet, the 10 per cent shift amounts to 25 per cent of demand deposits and over 30 per cent of time deposits held by the public in 1929—a very large amount all to be explained by transfers induced by banks. There is also some direct evidence weakening this explanation. The growth of time deposits did not lodge predominantly in large city banks, where large time deposits were concentrated and most of the alleged transfers might be expected to occur. The number of time depositors in national banks grew commensurately with the growth of such deposits,

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[12] *FRB*, Nov. 1938, pp. 969–970; and Mar. 1961, p. 288 and *Report of Committee on Bank Reserves of the Federal Reserve System*, 1931, pp. 14–15.

[13] Allegedly there were also some illegal misclassifications of deposits, especially in New York City. See the remarks of Irving Fisher in *Econometrica*, Apr. 1946, p. 179.

and their average increase was not more than the increase in other commercial banks, contrary to expectations if depositors with large accounts were responsible. Interviews with bankers suggest that large transfers were minor. Small transfers were undoubtedly important in total, but they appear unable to explain the entire movement shown in Chart 18. Commercial banks, and particularly national banks, succeeded in capturing, one way or another, an increasing share of the savings business during the 1920's, as in the preceding two decades, and not entirely at the expense of demand deposits.[14]

Time deposits rose relative to demand deposits during the period also in many Western European countries including Great Britain,[15] where differences in reserve requirements were not involved. Since there is no evidence of widening interest rate differentials, the explanation might be that prosperity and financial stability, characteristic of that decade in the United States, lessened the demand for checking accounts relative to all other assets. That is to say, the list of liquid assets used for Chart 18 needs to be broadened to include other kinds of assets for judging movements in demand deposits. (Whether the movement in the British ratio occurred for the same reason may be questioned, however, since her economy was depressed during much of the 1920's.) The post-World War II period is similar, but U.S. rate differentials clearly widened then (see below), which makes a direct comparison of the two periods for this country of little value. The full explanation of these data for the 1920's remains uncertain.

1929 to 1943. For this and the next period, changes in interest rate differentials were large and seem to have played a major role (see the bottom panel of Chart 18). In the early 1930's the share of both time and demand deposits fell mainly because of the worsening financial situation, which damaged commercial banks more than other

[14] For the evidence cited in the second half of this paragraph, see D. R. French, "The Significance of Time Deposits in the Expansion of Bank Credit 1922–28," *Journal of Political Economy*, Dec. 1931, pp. 759–782.

An additional factor of uncertain importance is that the Comptroller of the Currency ruled in 1919 that national banks could actively promote savings deposits. Previously, doubt existed whether national banks could legally use the term "savings deposits," though they could pay interest on deposits; see *Instructions and Suggestions of the Comptroller of the Currency Relative to the Organization, Etc. of National Banks,* 1907 (Treasury Doc. 2476), p. 41, and subsequent editions.

[15] See Elmer Hartzel, "Time Deposits," *Harvard Business Review,* Oct. 1934, pp. 33ff.; and J. M. Keynes, *A Treatise on Money,* Vol. II, 1930, Chap. 23.

financial institutions. The continued fall in the share of time deposits in the later 1930's and early 1940's may be attributed partly to a reversal of the transfers induced during the 1920's and now prohibited by the Banking Acts of 1933 and 1935, but no doubt largely to the growing rate differential between time and other savings deposits.[16] During the war, U.S. savings bonds also became a strong competitor for all deposits.

The relative position of demand deposits, on the other hand, recovered after 1933 and grew appreciably until 1942 (or 1943, excluding savings bonds). The rise would appear smaller if we were to include currency among liquid assets. Nevertheless, the contrasting behavior of time and demand deposits is striking. No doubt some of the difference reflects a shift from time to demand deposits; although the rate paid on demand deposits was negative, the differential between the two actually declined after 1934 until 1944. Earnings on bank assets fell and could no longer justify a high rate on any deposits. The same was also partly true of assets of other financial institutions, however, and demand deposits probably gained at the expense of all assets in the economy (except for currency and probably U.S. savings bonds). Undoubtedly, too, special wartime factors were also involved in the large accumulation of demand deposits.

1943 to 1960. The rate differential between time and other savings deposits widened from 1947 to 1955, then narrowed, and the share of time deposits seems to have followed these movements, though their over-all share did not change much. The rapid growth of savings and loan associations in the postwar period, which seems to reflect the improvement in 1950 of the federal insurance for their shares,[17] has encroached to no apparent extent on time deposits (except perhaps

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[16] Confirming evidence of interest-rate effects by regression analysis is given by C. F. Christ, "Interest Rates and 'Portfolio Selections' among Liquid Assets in the U.S.," *Measurement in Economics: Studies in Mathematical Economics and Econometrics in Memory of Yehuda Grunfeld*, Stanford University Press, 1963. The results of his careful study should be viewed as tentative, because the data limited the analysis to the short period 1934–59, during which rates first fell until after World War II and then rose, providing only two fully independent observations of the effects of rate movements.

[17] Congress set up the Federal Savings and Loan Insurance Corporation in 1934, along with the Federal Deposit Insurance Corporation for commercial banks. The FSLIC expanded slowly at first and did not insure a majority of savings and loan shares until World War II. A factor initially limiting the appeal of savings and loan shares was that the terms of federal insurance, until changed in 1950, were less liberal than those of the FDIC.

briefly in the early 1940's) but mainly on other assets, particularly mutual savings bank deposits.[18]

Confusion is avoided by distinguishing between effects of changes in interest-rate differentials—a movement *along* a demand curve for an asset—and effects of changes in preference for an asset, given the differential rate—a shift in the demand curve. The widely noted long-run growth of nonbank financial intermediaries probably reflects primarily shifts in the demand curve due to gradual revisions of the public's estimate of their safety. Two important contributing factors in recent decades have been extension of federal insurance to private financial assets and the improved stability of the economy (absence of severe contractions). Compared with adjustments to such shifts in the curve, which may span many years, changes in interest-rate differentials are likely to be minor and short lived unless, of course, they are maintained by legal ceilings. In the latter case, the regulated assets acquire a permanently unfavorable return relative to all other assets.

The declining share of demand deposits very likely reflects the substitution of a wide range of assets, no one of which can be identified as particularly important. No doubt the decline to 1949 represents simply a dispersal of large holdings accumulated during the first part of the war. It is the decline since 1951 reflected in the postwar rise in the velocity of money which has received so much attention. The decline in share (or rise in velocity) more or less coincided with generally increasing rates of return on time and savings deposits; since World War II and until about 1951 those rates had drifted upward, but slowly. It was in March 1951 that the Treasury–Federal Reserve Accord began a gradual rejuvenation of the conventional monetary measures for restraining credit. By September 1953, the Reserve System's policy of supporting the prices of U.S. bonds was explicitly abandoned, and market interest rates thereafter moved upward more sharply. Inasmuch as demand deposits have continued to bear a negative rate because of service charges, the decline in their share is widely attributed to the more attractive yields on alternative

[18] See the discussion in Milton Friedman and Anna Jacobson Schwartz, *A Monetary History of the United States, 1867–1960*, Princeton University Press for National Bureau of Economic Research, 1963, Chap. 12. See also "Time and Savings Deposits in the Cycle," *Monthly Review*, Federal Reserve Bank of New York, June 1962, pp. 87–88, and W. C. Freund, "Financial Intermediaries and Federal Reserve Controls Over the Business Cycle," *Quarterly Review of Economics and Business*, Feb. 1962, pp. 21–29.

assets. Whether changes in the rate differential are a major or a minor part of the explanation, however, is not clear.

The foregoing discussion of Chart 18 reviewing the interpretations usually proposed for those periods rests upon the appropriateness of the list of assets selected as close substitutes for time and demand deposits. That list, with minor variations, is now so commonly used in such discussions that its tentative nature needs to be stressed. Although these assets are all likely to be close substitutes among themselves, they may well differ in degree of substitutability for other nonliquid assets (like bonds or tangible assets). As a result, a shift may occur from mutual savings deposits to time deposits and from demand deposits to bonds, which appears to be a shift from demand to time deposits. The shifts are not distinguishable in the Chart 18 series. Such difficulties weaken the analysis, particularly of the liabilities of financial intermediaries such as savings and loan associations, which may experience rapid growth, perhaps, because in portfolios of individuals they substitute as much for stocks and bonds as for time or demand deposits. The analysis implicitly assumes that the liquid assets listed are much closer substitutes among themselves than with other assets. While the assumption may have some validity for savings deposits held by individuals, it seems insupportable for most demand deposits, for which many other assets may be important substitutes. Without more evidence, an analysis of relative movements in time and demand deposits is highly tentative.

The causes aside, the effects of the large shifts between time and demand deposits on the member bank reserve ratio are given in Table 18. The proportion of time deposits to total deposits at member banks has had a greater amplitude of variation than the proportion at other commercial banks has, and the difference between the required reserve ratio for demand and for time deposits is smaller for other commercial banks than for member banks (demonstrated in Table 20, below). Consequently, the effects of those shifts on the ratio for all commercial banks, if computed, would be smaller than the effects found for member banks alone.

The estimates in Table 18 were found by adjusting the reserve ratio for each of the three reserve classes of member banks for the effect on required reserves of shifts between demand and time deposits. Required reserves were increased by the amount legally released by a

TABLE 18

CHANGES IN THE MEMBER BANK RESERVE RATIO, SELECTED PERIODS, 1914-55

| | | NUMERICAL CHANGE IN PERCENTAGE RESERVE RATIO | |
| | | Due to Shifts: | |
Period[a]	Actual (1)	Between Time and Demand Deposits[b] (2)	Between Time and Demand Deposits, and in Total Deposits Among the Three Reserve Classes of Banks[c] (3)
1. 1914-31	-4.5	-1.7	n.c.
2. 1931-43	+9.3	+2.7	n.c.
3. 1943-55	-4.6	-0.8	n.c.
4. 1917-29	-4.6	-1.5	-1.4
5. 1929-40	+24.9	+1.5	+6.6

Source: Data underlying Tables F-11 and F-13. Data for 1914 and 1917 cover national banks only. Data for the small number of state member banks before 1918 are not available.

Note: n.c. = not computed.

[a]End of June except 1914, which is Dec. 31. For selection of periods, see text.

[b]Col. 2 is a weighted average of changes in the reserve ratio for each class of member banks, assuming the ratio of time deposits to total deposits had remained the same as at the beginning of the period. The weights are the proportion of total member bank deposits at each class at the beginning of the period. (Using the end-of-period proportions would give almost the same results.) An algebraic formula for the changes in any one class of banks follows: Let the reserve ratio for demand deposits D be R^D and that for time deposits T be R^T. Then the ratio R for total deposits is

$$R = \frac{R^D D + R^T T}{D + T} .$$

Any shift in the proportion of time deposits to total deposits between years o and t would produce the following change in the total ratio:

$$R_t - R_o = \frac{R^D D_t + R^T T_t}{D_t + T_t} - \frac{R^D D_o + R^T T_o}{D_o + T_o}$$
$$+ (R^D - R^T) \left(\frac{T_o}{D_o + T_o} - \frac{T_t}{D_t + T_t}\right) .$$

The change in the ratio for all member banks is then a weighted average of the change for each class of banks. The quantity $R^D - R^T$ is measured as of the end of the period, removing effects on the calculations of changes in requirements over the period. Its value for central reserve city banks, other reserve city banks, and country banks, respectively, was: .10, .07, and .04 for 1929 and 1931; .1775, .125, and .07 for 1940; .14, .14, and .08 for 1943; and .15, .13, and .07 for 1955.

[c]Computed as follows: changes resulting from shifts in the proportion of time deposits to total deposits were eliminated from the reserve ratio for each class of banks at the end of the period; the corrected ratios were then averaged by the distribution of total deposits among the three classes at the beginning of the period; finally, the resulting adjusted aggregate ratio was subtracted from the actual aggregate ratio at the end of the period.

shift to time deposits and were decreased by the amount legally added by a shift away from time deposits. A formula for their derivation is presented in a note to the table.

Lines 1 to 3 of the table for member banks cover the main shifts between time and demand deposits in all commercial banks (Chart 17). The first period, December 1914 to June 1931, covers the full duration of relative growth in member bank time deposits. The next two periods cover the years of maximum rise or fall in the proportion of time deposits at member banks (and all commercial banks; major turns in the proportions for both classes of banks approximately coincided). Column 2 shows the change in the ratio calculated as resulting solely from shifts between time and demand deposits to be compared with the actual change in the ratio in column 1. The changes in column 2, ranging from less than 1 to less than 3 percentage points, explain relatively little of the actual changes, except for the first period when the actual change was small.

The shifts contributed even less to the two major movements in the member bank reserve ratio since 1917 (see Chart 16), as shown by lines 4 and 5 in Table 18. The relative growth of time deposits from 1917 to 1929 subtracted 1.5 points from the member bank ratio, and their relative decline in the 1930's restored it. In the last period, the addition accounted for less than one-tenth of the rise in the ratio. The effect in the 1917–29 period was relatively larger but was offset in the early part of the period by the shift in all deposits, previously discussed, in favor of member banks (see Table 16). The entire decline of the ratio in that period and most of its rise during the 1930's, therefore, must be attributed to other factors.

Since Table 18 gives the effects produced on the required reserve ratio, it does not necessarily show the effects produced on the actual reserve ratio. Banks usually hold more reserves than required, and presumably the excess depends on, among other things, the relative amount of time and demand deposits, that is, there is one ratio for demand deposits and another for time deposits. The difference between the two ratios could be larger or smaller than that prescribed by legal requirements, so long as aggregate reserves satisfy total requirements. If the actual difference between the ratios for time and for demand deposits is larger than the required difference, the effects of shifts between time and demand deposits on the actual aggregate

ratio would be magnified as compared with the effects on the required aggregate ratio; and, if smaller, the effects would be reduced. The foregoing evidence alone does not show how the actual ratio was affected by the shifts examined; we need to know how the desired reserve ratios for the two kinds of deposits compared with the required ratios.

Nevertheless, reserves above required amounts do not create a serious problem in interpreting the results for most of the periods covered in Table 18. Such reserves were quite low in all but one of the terminal years. If reserves are not appreciably above requirements, banks must follow changes in required ratios closely. In the 1920's, for example, banks could not have expanded as they did without the benefit of reduced requirements provided by the shift to time deposits. The one exception is the second half of the 1929–40 period, when reserves were far above requirements. Banks may have used part of the excess reserves to satisfy the increased requirements arising from the shift in favor of demand deposits. Had no such shift occurred, they might still have had the same aggregate reserve ratio. On the other hand, they might have accumulated more reserves than required against demand deposits rather than time deposits; the shift to demand deposits would then have induced banks to augment their reserves.

If we assume all reserves in excess of requirements in 1940 were held against demand deposits, we attribute the maximum possible effect to the shift during that period, for this assumption gives the maximum spread between the ratios for the two kinds of deposits and so the maximum effect of the shift to demand deposits. An estimate of the effect based on this assumption is $+4.5$, three times the estimate given in the table. While probably an exaggeration, the larger estimate is still a small fraction of the actual change in the ratio.

In conclusion, the effects of shifts between time and demand deposits were not large relative to the major fluctuations in the reserve ratio. The effects appear relatively large only when changes in the ratio due to other factors were small. This finding may appear strange in view of the large fluctuations displayed by the proportion of time deposits to total deposits and in view of the close attention paid to rises in that proportion during the 1920's. The effects were small because the largest shifts between time and demand deposits occurred in country member banks. The difference between requirements for

the two kinds of deposits at country banks has been about one-half the difference at reserve city banks and even less than that at central reserve city banks. Consequently, a large part of the shifts had little effect on reserves. The importance of this point is brought out by a comparison of the effects of those shifts with the effects of deposit redistribution among the three classes of member banks. Col. 3 of Table 18 shows the combined effect on the reserve ratio of the two kinds of shift. In the 1920's their combination had slightly less effect than the shift between time and demand deposits alone. There was almost no redistribution of deposits among member banks during the 1920's (Chart 16). In the 1930's, however, the combined effect was considerably larger than the effect of shifts between time and demand deposits alone.[19] Shifts of deposits among banks, when they occur, are potentially important, because of the diversity between the reserve ratios for different classes of banks. Those differences are wider than those between the required ratios for time deposits and demand deposits of country member banks, where most of the shifts between the two types of deposits have occurred.

SUMMARY OF SHIFTS IN DEPOSITS

Shifts in deposits in the period 1875–1955 were not in general important. Shifts between demand and time deposits were large but did not appreciably affect reserves. A radical geographical redistribution of deposits could produce sizable effects if it involved banks having quite different reserve requirements, but only during the 1930's did that occur on a scale sufficient to have an important effect. The combined effect of the two kinds of shift, shown in column 3 of Table 18 for two major movements in the member bank reserve ratio since 1914, probably had even less effect on the reserve ratios of other commercial banks. Deposit redistribution probably had less effect on nonmember than on member banks, because most of the former fall in the lowest reserve classification. In addition, the proportion of time deposits to total deposits fluctuated less in nonmember than in member banks.

[19] This statement needs qualification for the possible influence of excess reserves, previously noted. The maximum possible effect of shifts between time and demand deposits for the 1929–40 period, taking excess reserves into account, was estimated to be +4.5, and the combined effect incorporating this estimate is +9.6. The shift between time and demand deposits, therefore, may possibly have been almost as important as the shift of deposits among banks.

On the presumption that the magnitude of those effects on other commercial banks was less than on national or member banks, we can compute a range that brackets the combined effect of the three types of shift on the reserve ratio for all commercial banks. Such a range is

TABLE 19

SUMMARY OF EFFECTS ON COMMERCIAL BANK RESERVE RATIO OF SHIFTS IN
DEPOSITS, THREE SELECTED PERIODS, 1898-1940

Period (midyear dates)	Actual[a] (1)	NUMERICAL CHANGE IN PERCENTAGE RESERVE RATIO Due to Shifts:			
		Total[b] (2)	Between Time Deposits and Demand Deposits[c] (3)	Among Reserve Classes of Banks[d] (4)	Between National or Member and Other Commercial Banks[e] (5)
1898-1906	-5.4	-1.5 to -2.3		-1.4	-0.8
1917-29	-3.7	1.0 to -0.2	-1.5	0.1	1.5
1929-40	23.1	8.6 to 10.6	1.5	5.1	4.1

[a]Table F-10.

[b]Change in actual ratio minus change in hypothetical ratio, assuming no shifts. The latter ratio is a weighted average of ratios for national or member banks and other commercial banks (from Table F-10, cols. 2 and 3), adjusted for the effect of shifts recorded in cols. 3 and 4, above, where the weights are the distribution of deposits between the two classes of banks at the beginning of the period (Table F-9).

The change in the ratio for other commercial banks was assumed to be the same as for national or member banks in deriving the right-hand figure and was assumed to be zero in deriving the left-hand figure. Consequently, the right-hand figure equals the sum of cols. 3 to 5, except for rounding errors, and the left-hand figure is a weighted average of assumed changes in the ratios for the two classes of banks.

[c]For national or member banks only (same as col. 2, Table 18). Whatever the size of such shifts 1898-1906, in all likelihood they had small effects, because the difference in reserve requirements between time deposits and demand deposits was zero for national banks and probably not large for other commercial banks, as a group.

[d]Difference between a weighted average of ratios for three classes of member banks at the beginning and at the end of the period, where the weights are the proportionate share of deposits in each class. This average equals col. 3, minus col. 2, in Table 18.

[e]Computed as for Table 16, col. 4, and therefore too large in absolute value (see note d to that table).

shown in column 2 of Table 19 for three of the largest movements in this ratio. The combined effect accounted for about 40 per cent, more or less, of the actual rise in the ratio during the 1930's and was due in part to all the distributional shifts. The same can be said about the fall in the ratio from 1898 to 1906, with the qualification that whatever shifts occurred between time deposits and demand deposits can not be measured. In 1917-29 and other periods, the effects of those shifts were much smaller in absolute terms, even though sometimes large

relative to actual changes in the ratio. There was no inherent reason the shifts should work in the same direction, and they did not always. In the 1917–29 period, the effect of the shift in favor of time deposits was almost completely offset by the other two types of shift, and the combined effect of all three on the ratio was negligible.

Cyclical shifts of deposits occurred between reserve city national or member banks and other banks. A possible explanation is that deposits shift to large cities in recessions and away from them in prosperity, and that a majority of the banks in large cities are central and other reserve city national or member banks. The phenomenon has interesting implications for the relative demand to hold money of different groups over the cycle and merits further study, even though its effects on the reserve ratio were relatively small.

The largest differences in the ratios for individual banks are mainly between those subject to different reserve requirements. For that reason, shifts in deposits between such banks, on which the preceding analysis was based, are likely to be the most important.

2. *Legal Reserve Requirements*

Legal reserve requirements give monetary authorities immediate control over the capability of banks to extend loans. A substantial increase in requirements with no compensating increase in high-powered money or decline in the currency ratio may make the amount of reserves above requirements—usable reserves[20]—temporarily negative and thereby force banks to contract earning assets in order to accumulate funds. A reduction in requirements may present banks with such large usable reserves that terms and interest charges on loans are quickly lowered to take advantage of the new opportunities for expanding earning assets. Historically, most new requirements have been intended to influence the disposition of banks to expand credit, but usually the size of the changes were small and the effects undramatic. Sometimes they resulted merely from technical changes

[20] The more attractive words "excess" and "free" have been usurped by common usage to mean something else than usable in this context, so usable reserves is the closest synonym. "Excess" reserves stand for actual balances with Federal Reserve Banks *less* required balances. "Free" reserves stand for excess reserves *less* member bank borrowings from Reserve Banks. Usable reserves, as defined here, equal excess reserves *plus* vault cash. (From June 1917 to December 1959, no part of vault cash satisfied member bank reserve requirements; since November 1960, all does.)

in the definition of the deposit base on which required reserves were computed. Reasons for the major changes in national or member bank requirements are briefly reviewed below, after which the effect of changes in requirements on the reserve ratio are examined. The requirements for other commercial banks, also discussed below, varied among states and are best summarized on an average basis for selected dates.

MAJOR CHANGES IN NATIONAL OR MEMBER BANK RESERVE REQUIREMENTS

From 1864, when the National Currency Act of the year before was amended, until 1914, the legal reserve requirements for national banks were changed only three times. First, the act of June 20, 1874, repealed the reserve requirements for notes and provided that a redemption fund equal to 5 per cent of the notes outstanding be deposited with the Treasury, though the full amount of the fund could be counted toward the reserve requirement for deposits. Second, in 1902, U.S. deposits were exempted from reserve requirements.[21] Third, the Federal Reserve Act disallowed the inclusion of the 5 per cent redemption fund for notes in legal reserves for deposits.

Since passage of the Federal Reserve Act, requirements have been changed many times. The first occurred late in 1914 when national banks, as members of the newly established Federal Reserve System, had their reserve requirements reduced. While part of the reduction helped member banks finance the compulsory purchase of capital stock in Federal Reserve Banks without contracting other earning assets, required reserves were intentionally reduced more than the amount of those purchases to attract state banks into the System. The act also stipulated that required reserves deposited at correspondent banks, authorized under the national banking system, be transferred gradually to Federal Reserve Banks over a period of three years, after which only vault cash and deposits at Federal Reserve Banks were to qualify as legal reserves.[22] The effect of this provision

[21] For an engaging recital of the circumstances surrounding that ruling, see A. Piatt Andrew, "The Treasury and the Banks Under Secretary Shaw," *Quarterly Journal of Economics*, Aug. 1907, pp. 519–568. By later extensions that exemption lasted until June 30, 1914, and was subsequently reinstated for the period Apr. 24, 1917, to Aug. 23, 1935. Nearly all U.S. deposits were again exempted during World War II.

[22] The first instalment was payable entirely in gold or lawful money and the rest, half in eligible paper. Also, in figuring requirements, deposits due from banks were still deductible from deposits due to other banks, so that a fraction of interbank deposits in effect counted as legal reserves.

was gradual reduction of the amount of deposits member banks could create per dollar of high-powered reserves. Six months before the transitional period was scheduled to end, the 1917 amendment to the act was passed specifying that all required reserves be deposited immediately with Federal Reserve Banks. That provision would have raised reserve requirements, but a further stipulation of the amendment, designed to make it acceptable to member banks, lowered the total amount of required reserves. Transfer of all reserves to Reserve Banks aided the campaign of the Federal Reserve Board to acquire as much of the domestic gold stock as possible, a step thought necessary to meet the demands for credit expected to arise out of the nation's entry into World War I.[23]

The requirements instituted at that time remained in force until August 1936, when the Federal Reserve took steps to eliminate member banks' large holdings of excess reserves. Accumulated from gold inflows in the preceding years of business recovery, they were viewed as a potential source of inflation. The Banking Act of 1935 had endowed the Board of Governors with new authority to set reserve ratios at any level between specified minimums and maximums. The August increase was the first of three which, together, raised the required ratio by May 1937 to the legal maximum for all member banks.

Since then, the Board of Governors has changed requirements many times, though never by so much in so short a period. It reduced them moderately during the severe business contraction in 1938 and then in 1941 reinstated maximum requirements. During 1942, requirements for central reserve city banks were reduced to facilitate the continued active participation of those banks in Treasury financial operations. Requirements for the other banks remained unchanged until 1948, when temporary legislation was enacted raising the maximum required level of reserves in an effort to stem the inflationary consequences of wartime financial policies. The Board immediately utilized the authority granted and put higher requirements into effect. When the 1949 contractionary tendencies of business were recognized, the Board rescinded over one-half the previous increase and, in June when the special authority expired, the rest. Further reductions followed in August and September of that year. Since 1949, requirements have been changed frequently but in small steps: from 1950

[23] See W. P. G. Harding, *The Formative Period of the Federal Reserve System*, Boston, 1925, pp. 70 ff.

through 1955 the highest required ratio imposed exceeded the lowest by only 4 percentage points for central reserve city banks and by only 2 for other banks.

Of the five largest changes since 1914, two worked to counter the prevailing movement in the money stock: one raised requirements during World War II; another lowered them during the 1949 contraction, though somewhat late. The other three were ill timed so far as monetary stability was concerned. One, which was the largest reduction in requirements ever granted at one time, was made during World War I and enabled banks to aid in the inflationary financing of Treasury deficits. The other two in 1936–37 and 1948, each a series of increases imposed over a relatively short period, reversed policies of credit ease which threatened to produce inflation but, as it turned out, coincided with or slightly preceded downturns in the economy.

CHANGES IN REQUIREMENTS OF OTHER COMMERCIAL BANKS

Reserve requirements for other commercial banks vary from state to state and cannot be so handily summarized. Considerations of short-run monetary stability have not played much part, as they do to a large extent in changes of member bank requirements. For one thing, requirements in many states can be altered only by their state legislatures,[24] rather than, as in others, by authority delegated to state banking commissions. Consequently, state requirements as a whole have been changed much less frequently than member bank requirements have and primarily for purposes related to long-run goals of banking regulation.

Federal regulations have provided a standard toward which state requirements have slowly gravitated.[25] Before the Civil War, only Louisiana, in 1842, and Massachusetts, in 1858, passed laws specifically requiring reserves against deposits. After passage of the National Currency Act, the first state to impose reserve requirements was Michigan, in 1871. New York State, often a leader in such matters,

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[24] Twenty-five states as of 1951. See *Monetary Policy and the Management of the Public Debt*, Joint Committee on the Economic Report, 82d Cong., 2d sess., 1952, Part 1, p. 471.

[25] The rest of this paragraph is based on R. G. Rodkey, *Legal Reserves in American Banking*, Michigan Business Studies, Vol. VI, 1934, Chaps. 3 and 5.

did not act until 1882, though most members of the New York City Clearing House agreed among themselves in 1858 to maintain a minimum reserve of 20 per cent. As late as 1900, only seventeen states had enacted such provisions. Thereafter, interest in the regulation of banking quickened, and all but six states imposed some kind of restriction on deposit reserves before passage of the Federal Reserve Act, and the six fell in line soon after.

Because of the great variety in state reserve requirements, the best way to summarize them is to treat other commercial banks as a group and compute total required reserves as a percentage of total deposits by taking an average of state reserve requirements weighted by the deposits of the commercial banks subject to them in each state. Construction of an average for frequent intervals would be tedious, and has not been attempted. A summary of requirements for all states has been published for ten different dates from 1909 to 1950, from which a good indication of the trend in the aggregate reserve ratio for those banks can be derived.

Averages for the ten dates are given in Table 20. Because of the assumption that all state regulations apply to private banks—though some may not—these figures may overstate the true average requirement including those private banks. The overstatement is negligible, however, since deposits of private banks have accounted for a very small part of the total covered by the table. A more important difficulty is that many states impose higher requirements on banks in designated reserve cities than elsewhere. Since deposits in such banks are not usually listed separately in state banking reports, their requirements could not receive separate weighting—New York excepted. In that state, the wide variety of requirements for different classes of banks and the large amount of deposits warranted special treatment. For other states, two averages were made, one treating all banks as though subject to the highest requirement in the relevant state, and the other, as though subject to the lowest. The range so obtained and recorded in Table 20 is, on the whole, fairly narrow and does not obscure the main trends in the aggregate ratio. The bulk of banks and deposits probably fall in the low reserve classifications, despite the inclusion of most larger banks in the high classifications, and a correctly weighted average would probably fall close to the lower end of the range.

TABLE 20

REQUIRED RESERVE RATIO OF OTHER COMMERCIAL BANKS, SELECTED YEARS, 1909-50

Year	High-Powered Reserves Required[a] per $100 of:			Total Cash Reserves Required[b] per $100 of:		
	Demand Deposits (1)	Time Deposits (2)	Total Deposits (3)	Demand Deposits (4)	Time Deposits (5)	Total Deposits (6)
1909	5.5-7.6	2.1-3.2	4.2-6.0	12.9-14.4	6.9- 9.1	10.7-12.5
1913	5.2-7.1	2.8-4.4	4.2-6.0	14.1-17.1	9.3-13.2	12.1-15.4
1915	5.0-7.0	2.6-4.2	4.7-5.9	13.4-16.2	8.4-11.9	11.4-14.5
1917	5.0-6.9	2.5-3.9	4.0-5.7	13.1-16.5	8.1-11.1	11.1-14.4
1924	5.1-5.9	1.3-2.9	3.4-4.6	12.6-14.7	7.7- 9.3	10.5-12.3
1928	3.9-5.6	1.1-2.1	2.6-4.0	12.4-14.5	7.0- 8.4	9.9-11.6
1930	4.1-5.6	1.1-1.4	2.7-3.7	12.2-14.1	6.3- 8.0	9.5-11.3
1937	4.8-6.3	1.2-2.1	3.5-4.8	12.4-14.4	5.9- 7.6	10.1-12.0
1944	2.7-4.1	1.0-1.7	2.2-3.5	10.8-12.8	6.0- 7.4	9.5-11.4
1950	0.4-1.3	0-8.1.1	0.6-1.2	13.8-16.2	7.0- 8.0	11.8-13.8

Source, by Year

1909: Samuel A. Welldon, Digest of State Banking Statutes, National Monetary
   Commission, 61st Cong., 2d sess., S. Doc. 353, 1910, Charts A and C (there are
   a couple of negligible disagreements between this source and Rodkey, Legal
   Reserves).
1913 and 1915: Annual Report of the Federal Reserve Board for 1915, pp. 104-113.
1917: Federal Reserve Bulletin, Oct. 1917, pp. 768-796.
1924: FRB, Mar. 1924, pp. 154-181.
1928: FRB, Nov. 1928, pp. 778-804.
1930: FRB, Sept. 1930, pp. 570-597.
1937: FRB, Mar. 1937, pp. 188-219.
1944: Provisions of State Laws Relating to Bank Reserves as of December 31, 1944,
   Board of Governors of the Federal Reserve System (no date).
1950: Reserve Requirements for Non-member Banks, American Bankers Association,
   Sept. 1950. (For 1951, not shown, see source in text footnote 24.)
   Note: These ratios are averages of state reserve requirements weighted for
the quantity of demand, time, or total deposits held by the public at other
commercial banks in each state (from All-Bank Statistics). The lower end of the
range is an estimate using the lowest requirements in each state, and the upper
end, using the highest requirements. Both sets of requirements were averaged
by the same weights, except for New York State, for which a weighted average
was computed for the different classes of banks.
   The exact date within each of three years to which the requirements apply is
Dec. 31 for 1944, Jan. 1 for 1937, and May 31 for 1930. For the other years no
exact date was specified, and the requirements for different states may have
been compiled as of different dates within the year given. Most state require-
ments change infrequently, however, and the averages generally apply to the
entire year for which they were computed.

[a]Cash in vault only.

[b]Cash in vault plus balances with approved banks.

Table 20 helps to explain the difference between the total reserve
ratios for member banks and other commercial banks over the years.
The difference reflects a tendency of state regulations to permit banks
under state control to rely heavily for reserve purposes on total cash
reserves, that is, on balances at other approved banks as well as on
vault cash. The main reason for disallowing unlimited use of interbank
balances for reserves is, of course, that the practice permits banks to
create a pyramid of credit which can be very unstable. The Federal

Reserve System was founded to correct such weaknesses of the national banking system and, accordingly, has authorized only high-powered money for legal reserves of banks under its jurisdiction. Deposits at nonmember banks have dwindled to a small share of the total, and the resources of Federal Reserve Banks help to strengthen the financial security of all banks. These considerations perhaps explain the growing tendency of states to allow interbank balances to satisfy reserve requirements and so to produce a gradual reduction in high-powered reserve requirements without a corresponding decline in total cash reserve requirements of other commercial banks.

The smaller difference between required high-powered reserves for time deposits and demand deposits in 1944 and 1950 stems from the gradual elimination of vault cash as a required component of total reserves, making required high-powered reserves zero; it may also stem from a redistribution of deposits toward states with lower demand requirements. (In 1950, the latter tendency actually reversed the usual relation between requirements for the two kinds of deposits and made the average high-powered requirement for time deposits greater, even though in every state except Missouri required reserves were at least as large for demand deposits as for time deposits.) The difference between requirements for time and demand deposits in the early years helps to explain why, during the 1920's, the increase in the proportion of time deposits in member banks exceeded the increase in that proportion in other commercial banks. Some nonmember commercial banks had lower requirements on time deposits than on demand deposits well before the Federal Reserve Act introduced that distinction into the regulations for national banks; and the relative advantage to other commercial banks in the lower requirement for time deposits changed little during the 1920's.

As for the general movement of state reserve requirements over time, Table 20 shows little change between successive dates, at least in comparison with the sharp variations in member bank requirements. As noted, changes made by individual states have been infrequent, though often quite drastic and all at once. Since the actions of most states were taken at infrequent intervals, no one group of actions had much effect. Consequently, the average tends to smooth variations in the individual components.

One of the largest changes in high-powered reserve requirements

CHART 19

*High-Powered Reserve Ratio of Other Commercial Banks,
Annually and Semiannually, 1875–1955*
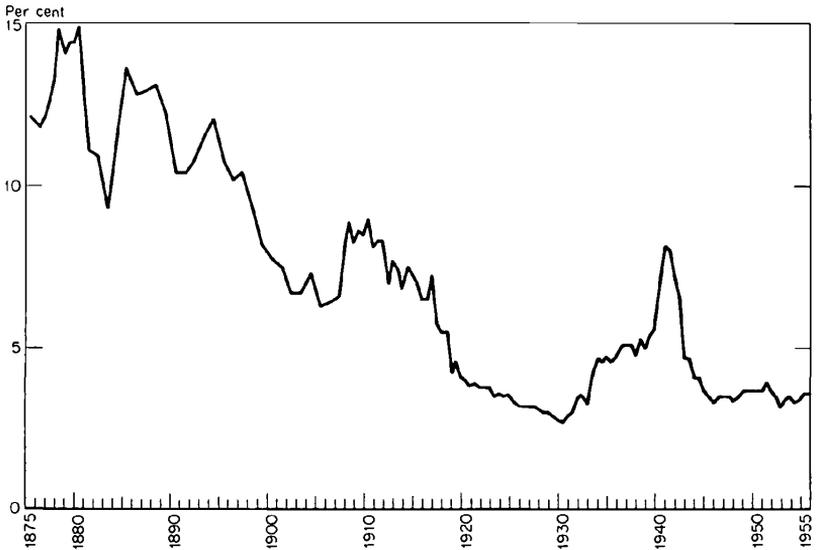
Source: Table F-10, col. 3.

for total deposits of other commercial banks was a reduction of 1.3 percentage points from 1915 to 1924. It corresponds with a decline of 3 points or more in the total reserve ratio for those banks from 1916 to 1924, as shown by Chart 19. The decline in requirements, therefore, can explain less than half the decline in the total reserve ratio. The chart shows considerably more variation than could be accounted for by changes in requirements. Moreover, most of the changes in requirements were too small for their effects to show up, and the data offer little evidence on reactions of banks to different levels of requirements. For present purposes, we must rely on national-member banks, whose reserve requirements have undergone wide variation.

EFFECTS OF CHANGES IN NATIONAL AND MEMBER BANK
RESERVE REQUIREMENTS

Table 21 shows the effects of all changes in national-member bank reserve requirements greater than 1 per cent of total high-powered

reserves (required plus usable reserves). All changes in the same direction and in steps within a year of each other have been grouped together and listed as a single change, except in lines 13 and 14. The latter include some changes dated slightly less than a year apart but nevertheless listed separately, because more than a year separates the largest change in each group. Columns 1 and 2 give two measures of the amount of reserves released or tied up by the change in requirements. The second in column 2, expressed as a percentage of deposits, gives the change in the required reserve ratio. These measures are calculated for the call date immediately preceding the date of the change in requirements, in order to exclude immediate increases or decreases in deposits that may have resulted from banks' reactions to the changes. This procedure, of course, ignores any alteration in reserves made before the preceding call date, in anticipation of the change in requirements; changes were not announced long in advance, however, and anticipatory actions were probably minor.

Whether a change in the required reserve ratio affects the total ratio depends on the reactions of banks. At first, the entire effect falls on the usable reserve ratio, since there is no time to adjust total reserves. If banks allow their usable reserves permanently to absorb the full change in requirements, no subsequent adjustment in total reserves will occur, and the changes would have no effect on the total reserve ratio. The total ratio would be affected if usable reserves do not fully absorb changes in requirements, after time for adjustments. As one possibility, banks might maintain their usable ratios at predetermined levels wholly unrelated to their required ratio, by contracting non-monetary assets to meet all increases in requirements and using additions to reserves produced by decreases in requirements to acquire such assets. Changes in the required reserve ratio would then have no effect on usable ratios, except during a short-run adjustment period, and would eventually produce an equal change in total ratios.

Columns 3–5 in Table 21 indicate whether, within a given time span, the total or the usable ratio tended to absorb most of the historical changes in requirements. These columns give changes in semiannual series of the total, required, and usable ratios, from the nearest June or December preceding the initial date of a new set of requirements to the first June or December at least three months after

TABLE 21

EFFECTS OF ALL MAJOR CHANGES IN RESERVE REQUIREMENTS ON NATIONAL OR
MEMBER BANK RESERVES, 1875-1955

Dates of Impositon of New Reserve Requirements	Reserves Released (-) or Tied Up (+) by Changes in Requirements as Percentage of:[a]		Numerical Change in Percentage Reserve Ratios Between Dates Before and After New Requirements[b]		
	High-Powered Reserves (1)	Deposits (2)	Total Ratio (3)	Required Ratio (4)	Usable Ratio (5)
1. Oct. 4, 1902	-3	-0.6	n.c.	n.c.	n.c.
2. Jan. 14,1914	3	0.5	-0.1	0.8	-0.9
3. Nov. 16, 1914	-13	-1.9	0.7	-3.0	3.7
4. Nov. 16, 1915-16	14	2.1	0.4	3.1	-2.7
5. June 21, 1917	-21	-3.1	-2.8	-4.5	1.7
6. Aug. 16, 1936 to May 1, 1937	47	8.8	4.7	8.2	-3.5
7. Apr. 16, 1938	-10	-2.2	3.3	-2.0	5.3
8. Nov. 1, 1941	8	2.4	-4.4	2.5	-6.9
9. Aug. 20 to Oct. 3, 1942	-9	-2.3	-5.7	-2.8	-2.9
10. Feb. 27 to Sept. 24, 1948	16	2.9	2.7	2.9	-0.2
11. May 1 to Sept. 1, 1949	-18	-3.7	-3.8	-3.7	-0.1
12. Jan. 11 to Feb. 1, 1951	11	1.8	1.6	1.9	-0.3
13. July 1 to 9, 1953	-5	-1.0	-0.4	-0.4	0.0
14. June 16 to Aug. 1, 1954	-7	-1.3	-1.3	-1.3	0.0

Source, by Column

(1): Beginning Nov. 16, 1914, comprises seasonally unadjusted data for vault cash
and amounts due from Federal Reserve Banks; before that date, comprises vault
cash of national banks (National and Member Bank Call Reports).
(2): Comprises seasonally unadjusted data on individual and postal savings deposits
and net amounts due to nonnational banks (before 1914) or nonmember banks.
Since the percentages are essentially a weighted average of changes in reserve
requirements for different classes of deposits, the weights are unlikely to
contain much seasonal variation (National and Member Bank Call Reports).
(3-5): Based on Table F-11 and the seasonally adjusted series in Table F-12, de-
rived according to the same definition of deposits and reserves used for cols.
1 and 2. The series are annual (call dates nearest Oct. 1) until June 1914,
semiannual (call dates nearest June and Dec.) thereafter.
Note: The decrease on Oct. 4, 1902, and the increase on Jan. 14, 1914, were
the only changes in national bank required reserves from 1875 through Oct. 1914,
with one exception: the redefinition of net demand deposits on June 30, 1914, to
include U.S. deposits, which amounted to a change in requirements on that date
equal to only 0.8 per cent of reserves held and 0.1 per cent of deposits.
The table includes all changes for member banks through 1955 except a few in-
volving a redefinition of net demand deposits (see Banking and Monetary Statis-
tics, p. 66, n. 13). The date of the redefinition with the largest effects was
Aug. 23, 1935, when U.S. deposits were included, and demand deposits due from
other banks could be deducted from total demand deposits instead of from demand
deposits of other banks only, as before. The data are not available to make ex-
act calculations of the effects of such changes, but all were negligible. The
effect on reserves of the 1935 change was only about 0.6 per cent of reserves
held and 0.1 per cent of deposits on June 29, 1935 (as derived from estimates
given in "History of Reserve Requirements for Banks in the United States,"
Federal Reserve Bulletin, Nov. 1938, p. 961). Exemption of U.S. deposits from
net demand deposits, beginning Apr. 24, 1917, freed less than 0.2 per cent of
reserves held. The effect of the wartime exemption of U.S. deposits in War Loan
Accounts after Apr. 1943 cannot be computed, because there were no such accounts
previously.

NOTES TO TABLE 21 (concluded)

n.c. = not computed, because data for the nearest available date after the change were for a year later, hence not comparable with the 3-to 9-month period used in later entries in the table.

Changes Covered, by Line

1-5: Cover national banks only; the required figures for state member banks before 1918 are not available. This restriction of coverage results in little error, since there were few state member banks before passage of the act of June 21, 1917.

2: Represents the $35 million increase in required reserves owing to the Federal Reserve Act's discontinuance of the inclusion in lawful reserves of the 5 per cent redemption fund for national bank notes (sect. 20), enforcement delayed by Comptroller until after call date on Jan. 13, 1914.

3-4: Cover changes in high-powered reserves required by the Federal Reserve Act. Reserves held at central city or other reserve city banks, as previously allowed for national banks, had to be gradually transferred to Federal Reserve Banks. As to requirements for vault cash and amounts held at Federal Reserve Banks, the act provided for an immediate reduction when the System was established, shown in line 3. (Calculations were made on the basis of deposits classified as demand and time on Oct. 31, 1914; no allowance was made for possible transfers of de- mand deposits to time deposits when the lower requirement for the latter was in- stituted.) This line also covers the $54 million reserves tied up when national hanks purchased Federal Reserve Bank stock equal to 3 per cent of their paid-in capital and surplus, as required upon becoming member banks.

The 1917 act required high-powered reserves to be increased through transfer of balances at national bank reserve agents to Federal Reserve Banks, in three semiannual instalments to begin 12 months after the Reserve Banks opened for business. The transfers came between Nov. 16, 1915, and a year later, and their effects have been grouped together in line 4.

5: Covers the change in requirements specified by the act of June 21, 1917, partly amending the preceding provisions of the 1913 Federal Reserve Act. The compari- son is with the requirements in effect from Nov. 16, 1916, to June 20, 1917.

[a]Computed for the nearest call date preceding date of change in requirements on the basis of reserves required against time deposits and net demand deposits.

[b]Dates are just before, and three to nine months after, imposition of new requirements.

the final date of the set. By this method of selection, the end of the period could be as little as three months or as long as nine after the final date of the set. The derived period was selected because it never overlaps a subsequent change in requirements. The varying length of the period covered appears to be less serious for present purposes than the presence of sizable cyclical and random fluctuations in the required and usable reserve ratios, which may conceal tiny adjustments to small changes in requirements. Such fluctuations account for the discrepancy between columns 2 and 4. Only fairly large statutory changes in requirements are likely to provide reliable evidence on responses of banks to them.

A sharp difference in responses to the statutory changes in require- ments before 1948 and after is suggested by columns 3–5. In the later changes the usable reserve ratio returned almost exactly to its previous level; in the earlier changes, the usable reserve ratio absorbed a sizable part of the new reserve requirements. This might suggest that,

CHART 20

Reserve Ratios of National or Member Banks, Annually and Semiannually, 1875–1955

Total reserve ratio

Required reserve ratio

Usable reserve ratio
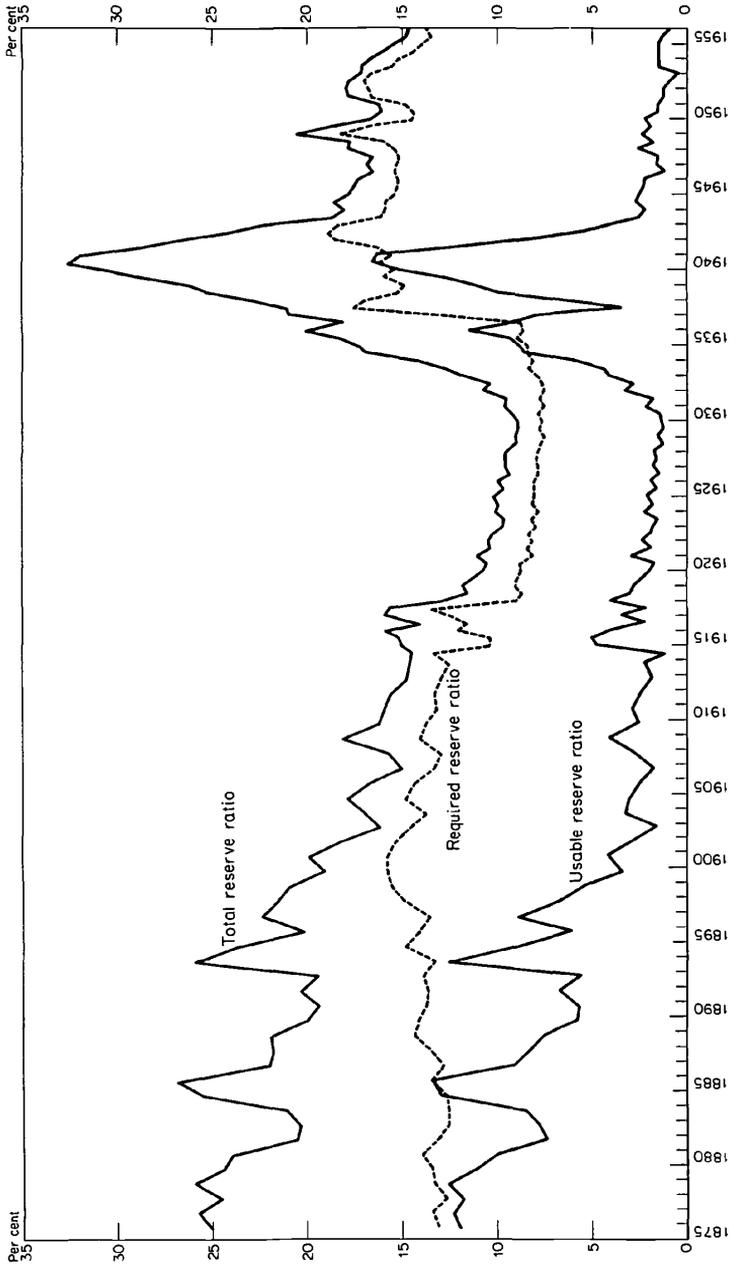
Source: Tables F-11 and F-12.

only since World War II, has the usable ratio been unaffected by changes in requirements, an interpretation consistent with the three changes from 1914 to 1916, when the usable ratio offset most of the required change and the total ratio hardly varied. (The lack of semi-annual figures before 1914 precluded an entry for the 1902 change.) For the others before 1948, however, the evidence is mixed. The usable ratio absorbed over one-third of the 1917 and 1936–37 changes, two of the largest ever imposed. For the remaining three changes in 1938, 1941, and 1942, other factors were obviously at work. The usable ratio changed considerably more than necessary to offset the new requirements in 1938 and 1941 and changed in the same direction the new requirements did in 1942. Usable reserves might offset either part or none of a change in required reserves but would not—unless for some other reason—offset more than the required change or reinforce it. These three cases offer little evidence, therefore, on responses of banks to changes in requirements.

One important factor in the postwar changes is the low level of the average usable reserve ratio consistently maintained by banks since World War II. This is evident in Chart 20, which shows the national or member bank total, required, and usable reserve ratios from 1875 to 1955. Before the end of World War II, the usable ratio fell below 2.5 per cent and remained below that level through 1955. With low usable reserves banks could meet increases in required reserves only by increasing total reserves or reducing earning assets; there were insufficient usable reserves to absorb higher requirements. The low usable ratio also indicates that banks had invested all but a minimum amount of their usable funds intentionally and did not wish to hold any more, for they quickly turned the reserves freed by the two postwar reductions in requirements into earning assets and so kept the usable ratio at the same level. In earlier periods, the usable ratio was at higher levels and could absorb at least part of the new increases in requirements, without the need for immediate increases in total reserves. This may explain why banks were slow to replace usable reserves absorbed by the earlier increases in requirements, and why they were slow to take advantage of the earlier reductions in requirements.

One interpretation of this evidence is that banks are quick to offset the effect of changes in requirements on the usable reserve ratio when it is very low; moderate variations when it is fairly high do not cause

concern, and usable reserves are allowed to absorb all or most of increases in requirements. By this reasoning, failure of the decline in total reserves to match the large 1917 reduction in requirements and failure of their rise to match the large 1936–37 increase could be ascribed to the high level of the usable ratio at those times. This interpretation is implicit in the reasons given by the authorities for most of the large increases: they were specifically designed to remove the inflationary potential of large usable reserves rather than to induce a rise in total reserves.[26] The actions assumed that accumulation of usable reserves results from the temporary unavailability of earning assets banks are willing to purchase. It follows that an increase in requirements then has no effect on the amount of total reserves banks desire.

This interpretation is open to question. That the usable reserve ratio can no doubt undergo larger variations when high than when low does not necessarily mean that banks are indifferent to the level of those reserves, even when large. An alternative interpretation is that banks want to keep their usable reserves at desired levels and will offset all but small variations in them—an explanation consistent with the postwar and also the earlier changes in requirements, when they are examined more closely. We may ask whether, at the time of the earlier changes, the usable ratio was strongly affected by other factors and, if they are taken into account, whether the total or the usable ratio did absorb most of the new requirements in the long run. Chart 20 will facilitate such an examination, because it shows movements in the usable ratio over the whole period and avoids the arbitrary limits of periods used in Table 21. The large abrupt changes in the required ratio which stand out in the chart reflect the imposition of new requirements. The other variations in this series, occasionally fairly large especially before 1910, reflect redistribution of deposits.[27]

The 1914 Increase in Requirements. The usable ratio had still absorbed most of the increase six months later. After that, the usable ratio series is swamped by the effects of the much larger reduction in

[26] For statements of policy on four of the increases when usable reserves were unusually large, see the *Annual Report*, Board of Governors of the Federal Reserve System, 1937, pp. 2–5; 1941, p. 7; 1948, p. 10; and 1951, p. 1.

[27] There are also minor changes of another kind in the required ratio: the deposit base for computing required reserves differs slightly from deposits as defined for the series in Chart 20, and the two need not maintain a constant proportion, though on the whole they did.

requirements in 1914, so the effect of the earlier reduction cannot be followed beyond six months in this series. That seems long enough, however, for banks to adjust to such a small increase. Apparently at that time banks were willing to see their usable reserves decline.

The 1914 Reduction and 1915–16 Increases in Requirements. Usable reserves rose to absorb the reduction in 1914 and later fell to absorb the increases in 1915–16. Banks kept their total reserve ratios roughly constant and allowed the usable ratios to fluctuate. There seems to be a special reason for the response to those changes: The Federal Reserve Act not only provided for the 1914 reduction in requirements but also scheduled increases somewhat greater in total amount to take effect at six-month intervals beginning one year later. Member banks made no noticeable short-run adjustment to the 1914 reduction probably in anticipation of the increases for which they prepared by saving reserves released by the reduction. The after effects of the panic of August 1914 were short lived and cannot explain the failure of the reserve ratio to decline. Beginning in 1915, there were large additions to high-powered money due principally to gold inflows. Such large and sudden increases in bank reserves cannot be quickly invested and may partly account for the rise in total and usable ratios in the year following the 1914 reduction in requirements.

The 1917 Reduction in Requirements. The total reserve ratio had absorbed about two-thirds of that reduction in the first six months and in the next twelve months had absorbed all of it, as Chart 20 shows. All the usable reserves freed by the reduction were therefore converted into earning assets, though the investment took a year and a half to complete. Such a slow adjustment might suggest that banks were not initially interested in investing all the freed reserves and only changed their minds because of the high wartime demand for loans or perhaps for other reasons. The slow adjustment can also be explained in another way: Not only was the 1917 reduction in requirements large, but it also removed vault cash from the category of legal reserves for the first time. Banks probably relinquished this traditional first line of defense cautiously and experimentally—a more plausible explanation, since the usable ratio remained low during the business recessions of 1919 and 1921 and the ensuing decade.

The 1936–37 Increases in Requirements. The total reserve ratio had absorbed only about half that series of changes in the six months

following the last of them, but that was probably too little time to allow a full adjustment. Those changes were by far the largest ever imposed within a year's time. Chart 20 shows that the level of the usable reserve ratio in mid-1936, just before the changes began, was fully restored by the end of 1938, two and a half years later, a recovery suggesting that banks increased total reserves in order to replace the usable reserves lost by the increase in requirements. This is not conclusive evidence, however. Unlike the other episodes considered so far, the total reserve ratio had been rising sharply before the 1936 increase in requirements and might have continued to rise even if requirements had not changed. In 1936, business activity, though rising, was still depressed, and interest rates were low. The state of the economy, therefore, might explain the further rise in total reserves. One interpretation consistent with the latter explanation is that large usable reserves reflect the unavailability of suitable investment outlets; under such circumstances, banks hold the funds idle, and an increase in requirements has no effect on desired levels of total reserves. The increase, by immediately wiping out part of the usable reserves, will actually prevent an expansion of credit if in the near future suitable investment opportunities arise. The official explanation of the series of increases in 1936–37 is explicit on this point:

Notwithstanding the fact that recovery [in 1936] was far from complete and that there was still a large amount of unemployment, boom conditions were developing in particular industries and boom psychology began to be manifested . . . . In August 1936 the Board of Governors had raised reserve requirements for member banks by 50 per cent in order to absorb a part of the $3,000,000,000 of reserves in excess of requirements held by member banks . . . . The Board's action was in the nature of a precautionary measure to prevent an uncontrollable expansion of credit in the future . . . . The increase in requirements had no perceptible effect on the credit situation, and money rates continued low . . . .

It was estimated that . . . , if requirements were increased by an additional $33\frac{1}{3}$ per cent, the banking system would still have the basis of a potential expansion of more than $5,000,000,000 without recourse to the Federal Reserve banks . . . . An increase in reserve requirements would not diminish the large volume of deposits of bank customers seeking investment which were ample to assure the continuance of favorable money rates for capital purposes.[28]

[28] *Annual Report*, Board of Governors of the Federal Reserve System, 1937, pp. 2–5.

TABLE 22

RESERVE RATIOS OF SELECTED FINANCIAL INSTITUTIONS, ANNUALLY, 1929-40
(per cent)

	MEMBER BANKS						OTHER FINANCIAL INSTITUTIONS		
	Usable High-Powered Reserve Ratio			Total High-Powered Reserve Ratio			Total High-Powered Reserve Ratio for	Total Cash Reserve Ratio	
Year (end of June)	Central Reserve City Banks (1)	Other Reserve City Banks (2)	Country Banks (3)	Central Reserve City Banks (4)	Other Reserve City Banks (5)	Country Banks (6)	Other Commercial Banks (7)	Mutual Savings Banks (8)	Savings and Loan Associations (9)
1929	1.5	1.4	2.1	15.4	9.0	7.1	2.9	2.4	n.a.
1930	1.3	1.5	2.5	18.2	8.9	7.5	2.7	3.2	n.a.
1931	1.6	1.9	3.0	17.0	9.0	7.7	3.0	3.9	n.a.
1932	3.5	2.0	3.2	17.6	8.9	8.0	3.6	4.4	n.a.
1933	4.0	3.9	4.3	18.9	11.1	9.1	4.3	4.4	n.a.
1934	12.5	7.9	6.7	26.9	15.5	11.6	4.6	5.3	n.a.
1935	15.8	8.2	7.2	30.3	16.1	12.2	4.6	5.3	n.a.
1936	14.6	10.3	8.0	30.7	18.3	12.3	5.1	5.4	5.4
1937	4.4	4.1	5.5	34.9	20.5	14.4	5.1	5.3	5.3
1938	19.0	8.2	6.7	46.5	22.0	13.9	5.2	5.6	5.7
1939	24.0	9.9	7.0	52.1	24.0	14.3	5.4	6.6	7.1
1940	29.1	14.6	8.9	55.7	28.8	16.0	7.1	9.1	7.5

Source, by Column

(1)-(6): Total reserve ratio (Table F-13) minus required reserve ratio (required reserves from Banking and Monetary Statistics, Board of Governors of the Federal Reserve System, 1943, divided by deposits (used for computations in Table F-13).
(7): High-powered reserve ratio (see Table F-10. col. 3).
(8): Total cash reserve ratio, including balances held at commercial banks (see Table F-17, col. 3).
(9): Ratio of total cash assets, including balances at commercial banks, to private share capital of all operating associations (see Federal Home Loan Bank Review, Statistical Suppl., 1947, p. 7, Table 7).

If banks raise their total reserve ratios in the face of stiffer requirements that merely reduce usable reserves, we can not know for certain whether their decision to bolster reserves was related to the new requirements. There are, however, other aspects of the behavior of member banks and other financial institutions, particularly in that period, which can shed light on the motives behind the increase in member bank reserves.

Evidence on the effect of the 1936–37 increase is afforded by the diversity of behavior of the usable ratios for the three classes of member banks. In columns 1–3 of Table 22, there is a pronounced variability in the usable ratio of central reserve city banks, much less in that of reserve city banks, and relatively little in that of country banks. One interpretation of this pattern is that, following the 1933 panic, central reserve city banks, and to a lesser extent other reserve city banks, fearful of further withdrawals, especially of deposits held by other banks, built up their usable reserves in defense. Since country banks held few deposits of other banks and could rely in emergencies on their balances at reserve city banks, they looked upon large usable reserves as less imperative. By this interpretation, the 1936–37 increase in requirements accentuated the differences between reserve city and country banks by striking deepest into the usable reserves of those

TABLE 23

EFFECT OF 1936–37 INCREASES IN RESERVE REQUIREMENTS ON USABLE
RESERVE RATIOS, THREE CLASSES OF MEMBER BANKS
(per cent)

Class of Member Banks	USABLE RESERVE RATIO[a]			Increase in Total Reserve Ratio as Percentage of Increase in Required Reserve Ratio
	June 30, 1936			
	Actual (1)	According to Requirements in Effect a Year Later (2)	Actual, June 30, 1938 (3)	$\dfrac{(3) - (2)}{(1) - (2)} \times 100$ (4)
Central reserve city	14.6	−1.6	19.0	127
Other reserve cities	10.3	−2.2	8.2	83
Country	8.0	+3.6	6.7	70

[a]Same as in Table 22.

banks in greatest need of them. Table 23 indicates that the required increases wiped out more than all the usable reserves held by central and other reserve city banks in June 1936, the first call date preceding the increases. It is significant that by the middle of 1938 central reserve city banks replaced somewhat more than their losses, other reserve city banks somewhat less, while country banks, which lost less than half their usable reserves, the smallest fraction of their losses. Since the first and second classes of banks outpaced the third in accumulating reserves before 1936, the repetition of the pattern after 1936 is not readily explained without taking account of required increases. Member banks appear, therefore, to have augmented their reserve position from 1936 to 1938 mainly to replace the reduction in usable reserves produced by the 1936–37 increases in requirements.[29]

This interpretation is strongly supported by the behavior of other financial institutions. Table 22 also shows that reserve ratios for other commercial banks, mutual savings banks, and savings and loan associations, none of which experienced important changes in reserve requirements during the period 1929–40, behaved similarly to the total and usable ratios of all classes of member banks, except in 1936–38. The ratios for all institutions rose moderately during the contraction in business of 1929–33 and then climbed markedly following the 1933 panic. In 1936–38, however, the member bank ratio is the only one not remaining relatively constant. Then, after 1938, all rose again, presumably in consequence of the continued low level of business activity and, perhaps, further decline in interest rates. This evidence indicates that only some factor specific to member banks—like increased requirements—can explain the 1936–38 rise in their reserve ratio.

[29] Clark Warburton reached a similar conclusion; see his "The Turning Points in Business Cycles," *Quarterly Journal of Economics*, Nov. 1950, pp. 547–548. See also Friedman and Schwartz, *A Monetary History*, Chap. 9; and Karl Brunner, "A Case Study of U.S., Monetary Policy: Reserve Requirements and Inflationary Gold Flows in the Middle 30's," *Schweizerische Zeitschrift für Volkswirtschaft und Statistik*, 94, 1958, pp. 160–201. For alternative explanations, see M. D. Brockie, "Theories of the 1937–38 Crisis and Depression," *Economic Journal*, June 1950, pp. 292–296, and G. Horwich, "Effective Reserves, Credit, and Causality in the Banking System of the Thirties," in *Banking and Monetary Studies*, D. Carson, ed., Homestead, Ill., Irwin, 1963.

A factor of some importance not mentioned in the text was the extremely large inflow of gold from abroad during that period. The inflow probably made the actual reserve ratio greater for a time than the desired ratio. This might account for the actual ratio's being somewhat higher than usual, but could not explain the continual rise in the ratio unless the size of the gold inflow continually became larger over the period—which was not the case.

Further evidence is provided by Canadian banks, which had no change in requirements and maintained roughly the same total reserve ratio through the second half of the 1930's[30], even though Canada experienced the same sharp decline in output during 1938, and in interest rates during the 1930's, as the United States did.

Increased requirements are not the only possible explanation of the rise in the member bank usable reserve ratio, to be sure, since the evidence does not rule out the possibility that it may have resulted from continuing apprehension instilled by the 1933 panic and by the business contraction from May 1937 to June 1938. Although central and other reserve city banks unloaded an appreciable part of their bond holdings beginning in early 1937—well before the downturn in business and hence caused by the increase in required reserves[31]—they were faced with a moderate reserve deficiency and had to contract earning assets to meet it. The original intention might not have been restoration of the usable ratio to its former level; the subsequent rise in the ratio might have reflected the sharp contraction in business during 1937–38. The behavior of the other financial institutions covered in Table 22 seems inconsistent with this explanation, but possibly not. Banks that owe large amounts to other banks may adopt special rules for safe operation, especially in a period like the five years following 1933, and cannot be compared with other financial institutions. On these grounds, the evidence in columns 7–9 of the table does not provide a norm for the behavior of central and other reserve city member banks, which are particularly vulnerable at a time of financial stringency and behave with prudent regard for their central position in the banking structure.

Such an argument, whatever its validity, cannot be applied to country member banks, however. The character of their liabilities is much the same as that of nonmember banks. While the total ratio for country banks did not rise so dramatically as that for all member banks and did not differ so markedly from that for other financial institutions, it did rise considerably from 1936 to 1938 when the ratio for other commercial banks was virtually constant. This suggests that the 1936–37 series of increases in requirements was the chief

[30] See George R. Morrison, "Liquidity Preference of Commercial Banks," unpublished Ph.D. dissertation, University of Chicago, June 1962, Chap. IV and Table 4.1.

[31] See Kenneth D. Roose, *The Economics of Recession and Revival*, New Haven, Yale University Press, 1954, pp. 104–117.

factor behind the concurrent rise in member bank total reserves.

The 1938 Reduction in Requirements. If the foregoing interpretation of the 1936–37 increases is correct, and if banks took more than a year to adjust to them, then the 1938 reduction of just a year later only served to speed the adjustment. The large rise in the usable reserve ratio immediately following the 1938 reduction, therefore, primarily reflects a continued adjustment to the preceding increases. The further rise in the next two years, however, was much too large to be ascribed to the preceding changes in requirements. Other factors seem to have been present.

The 1941 Increase and 1942 Reduction in Requirements. The 1941 increase wiped out usable reserves which member banks were already working down. The downward sweep of the usable reserve ratio hides whatever small effects the required increase in reserves may have produced. It is not possible to say whether, had there been no increase in requirements, the usable reserve ratio would have gone so far down as it did in the following year. In any event, the increase was nullified by the decrease less than a year later, in 1942, too soon to judge at what level the usable ratio would have come to rest. Nothing can be concluded about these two changes.

The effects on the usable ratio of changes in member bank reserve requirements up to 1942 are therefore mixed. The 1914 reduction was known not to be permanent; it was more than offset by the 1915–16 increases, which the Federal Reserve Act authorized along with the earlier reduction. The 1938–42 changes partly offset each other and also occurred during violent swings in the usable ratio, large enough to obscure small adjustments in the ratio.

The other three changes before World War II in 1917 and 1936–37 appear from the evidence presented to have been followed by offsetting changes in the total reserve ratio with the return of the usable reserve ratio to its former levels. The complete adjustments took well over a year, perhaps because of the magnitude of the changes. Those two were the largest ever imposed except the reduction in 1949, which slightly exceeds the 1917 one as measured in column 3 of Table 21. The remaining change, the fairly small increase in early 1914, was absorbed by usable reserves with no apparent attempt by banks to adjust total reserves. It offers the only clear-cut exception to the

proposition that banks in due course largely offset the effects on usable
reserves of changes in requirements.

The post-World War II changes provide the clearest evidence, as
previously noted, in favor of this proposition. None of them were
accompanied by violent swings in the usable ratio which obscured
the reactions of banks to earlier changes. In 1948 and 1951, the
required increases appear to have reversed movements of steady
decline in the total reserve ratio. In 1948 the total ratio rose sharply
after requirements were increased and before the recession beginning in
the last months of that year could have initiated a large addition to
reserves. Moreover, the ratio fell back just as fast when requirements
were reduced in early 1949, well before the revival in business ac-
tivity beginning in October. The usable reserve ratio fluctuated very
little about a slightly falling trend, indicating that the rise in the total
ratio fully reflected the required increase in reserves. In the first half
of 1951, the increase immediately appeared in the total reserve ratio,
while the usable reserve ratio continued a slow unbroken descent.
The 1953 and 1954 changes, as well, though fairly small, show up
immediately in the total ratio.

For all the changes considered together, therefore, the evidence
suggests that the desired level of usable reserves—though not constant—
is usually independent of required reserves, no matter how large the
usable reserve ratio may be. When that ratio is fairly low, however,
the adjustment of the usable ratio to its former level is perhaps quicker.
While we might also expect a faster adjustment to reductions in re-
quirements than to increases of the same size—on the ground that to
spend excess funds is easier than to recall loans and sell securities—
there is no indication of that difference. The 1948 increase and 1949
reduction provide a useful comparison for this purpose: they were
about the same size and occurred during the middle of successive years;
the total ratio offset both changes in about the same length of time.

The apparent independence of the required and the usable ratios
might, of course, be coincidence: each change in requirements might
have coincided with a change in usable reserves in the same amount
and direction, undertaken for other reasons. If the change in require-
ments offset the predetermined change in usable reserves, the latter
would remain at the same level—but such an offset would be rare.
Most of the larger changes in requirements were made for special

reasons unrelated to the predetermined level of usable reserves likely to be desired by banks. Other changes were ostensibly made to counteract business cycles, to be sure, but they have usually tended to correlate negatively with desired changes in usable reserves. When requirements have been raised to dampen a business boom, the desired level of usable reserves was likely to be falling, and conversely. Hence, while the effect of business cycles, as well as failure of banks to offset effects of changes in requirements on usable reserves, would have produced a negative relation between the required and the usable reserve ratios, on the whole the data show no relation.

From a bank's point of view, required reserves apparently are not reserves at all. They can be used only when a reduction in deposits releases them. It is not required reserves but unrestricted holdings of high-powered money and—except when all banks are under pressure—balances at correspondent banks that provide the first line of defense against heavy withdrawals. Under the national banking system, the Comptroller of the Currency had authority to close a bank that did not maintain its reserves above required levels except for temporary lapses. There was nothing to prevent the suspension of payments in time of heavy withdrawals except usable reserves and, perhaps, crude expedients like issue of clearing house loan certificates. Under the Federal Reserve System, an immediate penalty charge must be imposed for reserve deficiencies, and the Board has always limited borrowing to meet expected reserve deficiencies.[32] Banks have therefore held reserves above requirements to meet unexpected needs, and the existence of usable reserves has not meant that they maintain their desired level of total reserves regardless of the part tied up by requirements. By this interpretation, reductions in required reserves provide banks with extra funds, which gradually become invested in earning assets. Similarly, when required reserves are increased, usable reserves are maintained at previous levels mostly by contracting earning assets.

3. *The Long-Run Decline in the Usable Reserve Ratio*

Apart from changes in reserve requirements, the total reserve ratio reflects large variations in the usable ratio. Although we cannot

[32] See Robert V. Roosa, *Federal Reserve Operations in the Money and Government Securities Markets*, Federal Reserve Bank of New York, 1956, p. 24.

compute the usable ratio of other commercial banks, it undoubtedly has a high correlation with the total ratio of those banks, because their reserve requirements have changed only gradually. As indicated in Table 20, the required reserve ratio declined slowly after about 1917 and, before that, probably rose gradually as more and more states passed legislation dealing with reserves of state banks. Consequently, the total ratio of other commercial banks shown in Chart 19 probably fell slightly slower than their usable ratio did up to World War I and fell slightly faster thereafter. In general outline, its behavior appears to be similar to that of the usable ratio of national or member banks shown in Chart 20.

TIMING OF THE DECLINE

In addition to the pronounced cyclical variations in the usable ratios, both had a long-run trend, generally downward up to 1930, upward to about 1940, and then downward again to 1955. If we interpret the rise in the 1930's as a violent but essentially ·short-run cyclical movement, the trend appears at first sight to have been steadily downward since at least 1875. Yet, cyclical fluctuations obscure the movements before World War I; as a preliminary to discussing the possible factors behind that trend, we should determine the periods when the reserve ratio—omitting the effects of cycles—was declining and when it was relatively stable.

The fairly steady declines in the ratios from 1875 until 1930 could be illusory if the initial years were high for special reasons. The period 1875–79, for example, was one of severe depression and followed the panic of 1873, both of which undoubtedly caused banks to hold larger than usual reserves. To judge the trend properly, it is desirable to look at the behavior of the series in earlier years, for which the reserve ratios for national banks have been extended back to 1865 in Table 24. The data for 1863 and 1864 do not appear comparable and are omitted.

A change in requirements accounts for the decline in the required reserve ratio from 1873 to 1874 and seems to have affected the usable ratio in the way such changes worked in later years: the usable ratio first absorbed the full amount of the reduction in requirements and then later began to work down to its previous level. The movement in 1873–74 is obscured, however, by the panic of September 1873 just after the date of the entry for that year in Table 24. The ensuing

TABLE 24

NATIONAL BANK RESERVE RATIOS, ANNUALLY, 1865-75
(per cent)

Call Date Nearest Oct. 1	Total[a] (1)	Required[b] (2)	Usable (1)-(2) (3)
1865	45.3	20.8	24.5
1866	48.2	24.4	23.8
1867	43.3	24.7	18.6
1868	40.2	23.1	17.1
1869	39.4	23.5	15.9
1870	35.8	22.9	12.9
1871	31.6	22.4	9.2
1872	28.6	21.2	7.4
1873[c]	27.4	21.1	6.3
1874	27.3	13.2	14.1
1875	25.0	13.1	11.9

[a]Ratio of specie and currency holdings (including small
amounts of state bank notes) to individual deposits, state bank
notes outstanding, and net amount due to nonnational banks.
National bank notes were excluded from the denominator to main-
tain comparability with the series for later years in Table F-11.
    There are reports on national banks back to 1863, but reserve
ratios for 1863-64 are not comparable with later years because of
the rapidly changing structure of the national banking system in
the first years of its organization.

[b]For 1868 and after, ratio of all required reserves (Annual
Report, Comptroller of the Currency) to denominator used for col. 1.
For 1865-67, required reserves are not published and had to be es-
timated from statements of national banks for the three reserve
classifications. These earlier estimates are approximations only,
because there are no exact figures on permissible deductions from
aggregate liabilities to derive the base on which legal require-
ments were computed. It was assumed that "cash items in process
of collection" were deducted with the tacit approval of the
Comptroller (see Annual Report, 1868, p. XXIII), but that permission
to deduct "due from banks" from "due to banks" was not granted
until after 1867.

[c]Dated Sept. 12 just before the panic of that year broke out.

depression caused banks to hold for a time most of the subsequent
increase in their usable reserves provided by the change in require-
ments. Hence, the level of the usable ratio in 1875–78 was undoubtedly
above normal, and its level in the preceding years of prosperity will
be a more reliable indication of what it would have been in subsequent
years if business conditions had not taken a turn for the worse in 1873.

    From 1865 to 1873, the usable ratio had fallen rapidly—seeming
to reflect a steep secular decline. Yet such a conclusion is questionable
because there are good reasons the usable ratio may have been

abnormally high in 1865. During the Civil War, specie payments were suspended and the currency depreciated; yet it was widely expected that convertibility would be resumed soon after the end of hostilities. Convertibility, when resumed, would produce a contraction in money and prices to reverse the wartime inflation and to restore the currency's prewar parity with gold. In anticipation of the storm, banks probably bolstered their defenses by augmenting reserves. When, after 1865, convertibility appeared not imminent and the country had weathered the initial readjustments to peacetime conditions with little difficulty, they no longer needed large reserves and proceeded to run them down. Incomplete data on state banks for the period lend some support to this interpretation. The total reserve ratio of reporting state banks[33] rose at the outbreak of the Civil War and then fell after the suspension of convertibility. This series is not entirely comparable with the later series on national banks, however, and the two series do not overlap (the Treasury temporarily stopped collecting reports on state banks in 1863).

Though we cannot be certain, therefore, it is likely that the decline in the usable ratio for national banks from 1865 to 1873 at least partly reversed an earlier increase and so does not point to a long-run downward trend. It seems best to ignore the evidence of the immediate post-Civil War years and to judge the trend of the ratio from its course after the 1860's. To abstract from cyclical movements, we may look at its average levels during consecutive business cycles. The averages shown in Table 25 cover periods between successive business cycle peaks. The table shows a marked secular decline. The usable ratio for all national banks shows a drop of about three-quarters from 1869 to 1907, reflecting a decline for all three classes. The total ratio for other commercial banks also shows a decline, though not by so much. Since reserve requirements for state banks were being extended in the 1870's and 1880's, however, their usable ratios probably declined about as much as that for national banks.

The decline in the ratios progressed in spurts. For all national

[33] Total specie holdings of reporting state banks, as a percentage of deposits and bank notes outstanding on Jan. 1, was 18.9 in 1860, 20.4 in 1861, 22.6 in 1862, and 17.3 in 1863 (see *Annual Report* of the Secretary of the Treasury. 1863, p. 233). The usable reserve ratio, of course, was somewhat lower. Quarterly data for New York and Pennsylvania banks also show the same general pattern. The earlier data need adjustment, not done here, for the premium on gold in valuing specie holdings and gold deposits.

banks, there was little change up to 1887, then a sharp drop to a lower level was completed by 1890 and was not extended further until after 1899. Country national banks, however, made substantial reductions in their ratio earlier than city banks did. Central reserve city banks had about the same ratio in the late 1890's as in the 1870's and did not make

TABLE 25

AVERAGE LEVELS OF RESERVE RATIOS DURING REFERENCE
CYCLES, 1869-1907
(per cent)

Reference Cycles[a] (peak to peak)	Usable Ratio of National Banks				Total Ratio of Other Commercial Banks[b] (5)
	Central Reserve City (1)	Other Reserve Cities (2)	Country (3)	All (4)	
1869-73	n.c.	n.c.	n.c.	10.2	n.a.
1873-82	4.9	11.4	13.3	10.9	n.a.
1882-87	8.9	10.7	10.7	10.4	11.8
1887-90	4.5	5.8	8.2	6.9	12.3
1890-92	4.0	5.4	7.4	6.2	10.5
1892-95	11.4	6.4	9.3	9.1	11.4
1895-99	4.3	5.3	7.9	6.4	9.8
1899-1902	1.9	1.5	4.5	3.1	7.6
1902-07	1.5	1.3	3.4	2.5	6.7

n.c. = not computed.
n.a. = not available.

Note: Average levels computed from annual data (Tables 24 and F-11). Beginning and terminal years were given one-half weight.

[a]Year for which Oct. 1 was nearest the peak month of National Bureau reference cycles.

[b]
Table F-10, col. 3. Undoubtedly declines less rapidly than the un-available usable ratio for those banks.

most of their reductions until after 1899. (Since their ratios seem abnormally high in the mid-1880's and early 1890's, probably as a result of panics, it is safer to ignore the exceptional levels.) For other commercial banks, as well, most of the decline since the 1880's came after 1899. These observations of timing are based on average standings over business cycles. Some turns read from the annual series differ; in particular, Charts 19 and 20 show that the large decline in the averages after the 1899 reference peak actually began in 1897–98 in the annual series.

Some further declines in the average level of the ratios occurred in the 1920's and 1950's (Charts 19 and 20). Since by the early 1900's

usable reserves had fallen about as low as they could reasonably go without danger of becoming negative at the slightest jump upward in the currency ratio, the possibility of further declines was severely limited.

POSSIBLE EXPLANATIONS OF THE DECLINE

The decline is not the result of a quirk in the definition of the reserve ratio used. If we include in reserves balances due from other banks, and, in deposits, gross (rather than net) balances due to other banks, the ratios for national and for other commercial banks still show secular declines of roughly the same total amount though a few years later, around the turn of the century (see Tables F-15 and F-16), not before. This suggests that the decline in the high-powered reserve ratio of national banks from 1887 to 1899, before the all-inclusive ratios show much decline, reflected a shift to interbank reserves. The decline in the all-inclusive ratios after 1899 was greater for country banks than for the other two classes of national banks, suggesting that country banks, having relatively less high-powered reserves to begin with, went further than other national banks in replacing interbank balances with other earning assets. The ratio for reserve city banks, on the other hand, rose slightly during the 1890's and early 1900's, in contrast with the decline in their high-powered reserve ratio, indicating that they substituted interbank balances for high-powered reserves.

The all-inclusive ratios for all classes of banks fell again and more sharply after the Federal Reserve Act was passed; since the act reduced reserve requirements and ended use of interbank balances as legal reserves, the reduction in total reserves fell mostly on those balances. The all-inclusive ratio for other commercial banks also fell during the 1920's, but not much more than their high-powered reserve ratio did, since state requirements showed no tendency to remove interbank deposits from the list of legal reserves. The ratio for mutual savings banks exhibits no decline until after 1915 (see Table F-17). Hence the decline around 1900 apparently applied to commercial banks only. All our ratios exclude U.S. deposits, but they were usually too small to make any difference. At times, such as during World War II, U.S. deposits were large, but they were conveniently exempted from reserve requirements and not withdrawn except with advance

notice; consequently, they probably had little effect on the reserve ratio.

Interest Rates. A possible explanation lies in the movements of interest rates. Banks hold usable reserves as an alternative to earning assets and will tend to balance the security provided by $1 of cash against the income derived from $1 invested. The higher interest rates are, the greater the incentive is to get along with less cash; conversely, when interest rates are low, the advantage of holding large cash reserves appears high compared with its cost. Presumably, short-term rates approximate bank charges on call money and on commercial loans, and long-term rates reflect the prices of most bonds that banks invest in. Hence banks are likely to be sensitive to the entire range of rates.

For practical purposes one long and one short rate should suffice to represent the spectrum. Take long-term rates first. Macaulay's work[34] indicates that long-term rates around 1900 were at the lowest levels ever recorded before the late 1930's; yet the usable reserve ratio was then reaching new all-time lows, not the highs to be expected from an inverse relation between the two variables. It is true that long-term rates turned up moderately in 1899 on the first leg of a twenty-year rise, and it might be argued that the reduction of usable reserves beginning in 1897–98 anticipated that improvement in bond earnings. By buying when rates were low (and bond prices high), however, banks would suffer capital losses as rates rose. If they had anticipated the rise in rates, they would not have committed all their usable funds at the lowest rates, as in fact they largely did, though mostly in loans rather than bonds. Indeed, whether banks wanted a high yield or large capital gains, their funds should have been heavily invested in the late 1860's and early 1870's before the secular decline started and when rates were still high. Yet we saw that the usable reserve ratio was highest at that time. The yields on bonds with long maturities clearly do not explain the downward trend in the reserve ratio. No obvious transformation of those yields in an attempt to approximate banks' expectations of future movements in interest rates would alter this conclusion.

A long-run relation between the usable reserve ratio and interest

[34] F. R. Macaulay, *Some Theoretical Problems Suggested by the Movements of Interest Rates, Bond Yields and Stock Prices in the United States since 1856,* New York, NBER, 1938.

rates fares no better with short-term rates. True, those rates were rising after about 1897, when the usable ratio was falling; but they had been higher in earlier years, when the ratio was high, and touched levels at least as low in later years, when the ratio remained low. This evidence does not rule out some effect of interest rates on bank reserves, particularly for short-run cycles or for extreme movements like the 1930's, discussed further later, but it seems clear that any such effect is of secondary importance at best for secular movements and certainly cannot explain the downward trend in the reserve ratio.

Since interest rates are no help, we may look to developments in the economic and institutional environment to explain the downward trend in the ratio. Such developments are hard to quantify, and we must rely largely on qualitative evidence.

Establishment of the Federal Reserve System. One possibility is that the stability of the monetary system tended to improve over time. The most publicized contribution to that development was passage of the Federal Reserve Act. Previously, the banking system had to handle emergencies itself. After 1914, banks could look to Federal Reserve Banks to supply unforeseen demands for currency and could put all but required and working balances into earning assets. The creation of the Federal Reserve System probably accounted for part of the small but gradual reduction in the usable reserve ratio during the prosperous first decade and a half of its operation. In addition, member banks satisfy reserve requirements by their average holdings over a week or two, whereas national banks before 1914 had to meet requirements on a day-to-day basis. The founders of the System did not foresee these expansionary effects on the money supply.[35]

Although banks raised the usable reserve ratio in the 1930's to levels not seen in over fifty years, it does not seem necessary to treat the 1930's as a special chapter in banking history to be explained by economic stagnation and an unusual decline in the demand for loans. Confidence in the Federal Reserve System built up during the 1920's must have been shattered in 1933 when the System failed to prevent a disastrous deflation of bank credit and the highest rate of suspensions among federally supervised banks in history. In that year the number of suspended member banks was a catastrophic 18.7 per cent of all

[35]See Seymour Harris, *Twenty Years of Federal Reserve Policy*, Harvard University Press, 1933, Vol. 1, p. 261.

member banks operating at the first of the year. In the preceding three years suspensions had been much higher than normal but nothing like the contagion of bankruptcies in 1933.[36] The usable reserve ratio in the 1929–33 contraction did not rise to unusually high levels, and from 1933 to 1936 it went no higher than after panics or in depressions before 1914—1875-78, 1884-85, and 1894 (see Chart 20). Indeed, because usable reserves were so low in the early 1930's, partly in response to the supposed security provided by Federal Reserve Banks, member banks were hard hit by the 1933 panic. This, we may conjecture, goes a long way toward explaining why it wrought such havoc within the banking system when, by comparison, recuperation from previous panics had been remarkably fast. In the historical perspective of Chart 20, the large ascent of usable reserves from 1929 to 1935 does not seem extraordinary for such a period.[37] Part might also reflect a delayed adjustment to large gold inflows, though that would explain a temporarily higher level of the ratio, not a continued rise. After 1938, the usable reserve ratio reached unprecedented levels perhaps attributable in some degree to the extreme duration of depressed business conditions and extremely low interest rates, especially on short-term securities.

Since World War II, banks have apparently regained confidence in the Federal Reserve's ability and willingness to lend ample funds in a crisis. The large influx of gold during the 1930's and 1940's provided the Reserve Banks with a new margin of excess lending power over their statutory reserve requirements, which, in addition, were reduced in 1945. Hence, their ability to avert a liquidity crisis was not questioned in the prosperous climate of the 1945–55 decade.

[36] The percentage rate for 1930 was 2.3; 1931, 6.4; and 1932, 4.6. The highest previous rate for member banks was 1.7 per cent in 1926; the highest corresponding percentage for national banks prior to the Federal Reserve System was 1.8 in 1893. The highest rate for all commercial banks before the 1930's was 5.8 per cent in 1893 (see *Banking and Monetary Statistics*, p. 283; *Historical Statistics*, 1949, series N135; and *Banking Studies*, p. 418). Suspensions are closing of banks by civil authorities, other than during special holidays, and include suspensions subsequently lifted after reorganization or mergers. The 1933 figure does not include banks closed after the banking holiday but licensed to reopen by June 30 of that year, following the nationwide bank examinations during the holiday. There was, of course, a higher than usual rate of bank failures during the 1920's, but that reflected the agricultural distress and not lack of liquidity in the banking system as a whole like that during the early 1930's.

[37] Warburton (*Turning Points*) lists many possible reasons for the high level of the ratio in addition to the panic itself.

Federal Deposit Insurance. Deposit insurance has probably been a more important factor accounting for the low levels of the usable reserve ratio since the mid-1940's. Instituted in 1934, the Federal Deposit Insurance Corporation grew rapidly and soon insured nearly all commercial bank deposits up to a specified amount. The insurance strikes at the root of banking panics—fear of loss through suspension of payments—and thereby removes the main reason for holding large usable reserves. Since participating banks pay the estimated cost, its principal value is not so much as insurance to spread the risk of loss as a remedy to reduce the risk; its very existence reduces the incidence of losses by removing the likelihood of runs on banks. With wide participation in the FDIC achieved by the mid-1940's, banks returned the usable reserve ratio to low levels. In the prosperous year 1955, for example, this ratio for all member banks hovered around 1 per cent, barely enough to fill day-to-day needs for working balances.

The exact timing of the decline in the usable ratio in the early 1940's from the high levels of the late 1930's can be attributed to an improved business outlook and also to a change in government policy. In 1942, the Federal Reserve Banks promised to keep U.S. bonds at fixed prices, and banks soon converted their huge usable reserves into those near-moneys that paid interest. The purchases were made despite the historically low rate paid, which suggests that fear of capital losses—allayed now by the support program—was an important factor holding back such investments by banks in the late 1930's. The price-support program ended in 1951, and the low usable reserve ratio since then must be attributed to factors previously discussed and to the active market for federal funds, which developed during the 1950's.

Establishment of the National Banking System. Since creation of the Federal Reserve System and later of federal deposit insurance can explain the decline and continued low levels of the usable reserve ratio in most of the period since 1914, what explains its much more pronounced decline before that? The answer seems the same: improvement in the stability of the monetary system, even without the dramatic remedies instituted since 1914. There is no question that the national banking system set up in 1863 appreciably toned down monetary disturbances. The operation of national banks was a model of prudence compared with pre-Civil War banking practices and, although periodic panics still occurred, they did not match the financial upheavals of former years. One important factor was the issue of

clearing house loan certificates during panics, which helped alleviate the extreme distress of currency shortages. We may conjecture that banks gradually decided that usable ratios could safely be reduced in view of the improved financial climate.

Treasury Operations. A clue to an important factor in that decision is the timing of the largest noncyclical reduction in the 1897–1902 period. At that time, the Treasury began to use its cash holdings regularly for easing stringencies in the money market. The Treasury increased its deposits at national banks in the last quarter of each year to offset the seasonal drain of currency from bank reserves and, in business downturns, to offset the cyclical drain. It will be recalled (Chapter 4) that the currency-money ratio often rose moderately in reference stages IV through VII and by large amounts in panics, though the reference cycle patterns did not reveal the full amount of the rise. Those periodic pressures on bank reserves necessitated ample cash reserves. Before the late 1890's, as Chart 20 shows, banks kept large usable reserves, presumably for that reason. Afterward, 1897–1902, when Treasury intervention in the market in times of stress could be relied upon, banks were quick to find alternative uses for their large usable reserves.

That the Treasury might assume the functions of a central bank and alleviate monetary conditions had been recognized much earlier, but various difficulties stood in the way.[38] The main difficulty centered around the restrictions imposed by the Independent Treasury Act (1846), a relic of the pre-Civil War banking era which Congress could not be persuaded to repeal for a long time afterward. As originally passed, the act forbade the Treasury to make or receive payments with bank checks and notes or to hold its own funds on deposit at banks. Regional subtreasuries were set up to make and receive all payments in gold (or, as amended in 1862, in greenbacks, except government interest payments and customs duties). Since Treasury receipts and disbursements did not exactly coincide, the arrangement produced variations in high-powered money outstanding which upset the money market. To avoid a continual transfer of high-powered money to Treasury coffers throughout the 1880's, when the government budget was running a surplus, the Treasury had to retire its outstanding interest-bearing debt (mentioned in Chapter 3). To avoid variations

[38] This paragraph draws upon Margaret G. Myers, *The New York Money Market*, New York, 1931, Vol. I, Chap. XVII.

in high-powered money outside the Treasury in the short run, owing to discrepancies between receipts for tax revenues and disbursements for budget expenditures or bond purchases, the Treasury might have wanted to buy and sell short-term certificates of indebtedness or to deposit its cash holdings at banks. But the Treasury had no short-term debt outstanding or authority to purchase private debt, and the deposit of funds at banks was restricted by the Independent Treasury Act (as later amended) to revenues other than customs at the time of their collection; funds deposited in the Treasury could not be transferred to banks. In consequence, while the maximum level of the Treasury's cash holdings was kept down during the 1880's by bond purchases, it fluctuated erratically in the short run and generally to the detriment of monetary stability, as we shall see shortly. Treasury officials were so hard pressed just to hold down the government's cash surplus that they made various "interpretations" of the Independent Treasury Act and breached the restrictions on funds to be deposited at banks. The act's definition of proper collateral was successively relaxed, and various excuses for holding certain specified funds at banks were found. Congress finally authorized those actions after they had become precedents. By the early 1890's, however, when the Treasury had succeeded to some degree in learning how to live with the act, the budget condition turned from surplus to deficit, and for five years the Treasury concerned itself with little else than preserving its solvency. Until 1896, it repeatedly had to borrow and was in no position to come to the aid of the banks as a disburser of money in stringencies.

This brief review of the period helps to explain why the Treasury suddenly assumed the functions of a central bank in the late 1890's. After 1895, business improved, the government's finances again showed a surplus, and Secretaries of the Treasury turned their interest to wider horizons. A remarkable series of controversial pronouncements—for that era—emanated from that normally sedate post. It was proclaimed that the stability of the money market was the proper interest of the Treasury, and even that it had the power and obligation to eradicate monetary crises from the western world.[39] While the

[39] I refer to Secretary Shaw's famous 1906 report (see *Treasury Report*, 1906, p. 49); see also Friedman and Schwartz, *A Monetary History*, Chap. 4, sect. 1; and R. H. Timberlake, "Mr. Shaw and his Critics: Monetary Policy in the Golden Era Reviewed," *Quarterly Journal of Economics*, Feb. 1963, pp. 40–54.

Treasury may have been ready and willing to adapt its cash holdings to the needs of the market, how "able" was it?

In his study of seasonal movements in Treasury funds deposited at national banks, Kemmerer[40] found a marked contrast between the period before and after 1897. Before then, those deposits were usually low in the last three months of the year relative to the beginning months; the main exception was a slight increase in 1893, apparently because of Treasury bond sales. Otherwise, the Treasury tended to depress bank reserves in the autumn when they most needed bolstering. To check Kemmerer's results, which are based on absolute amounts, I computed the ratio of U.S. to individual deposits at national banks. It was usually around 1 per cent from 1880 to 1896 and, while more often lower than higher in the last months of the year, changes over the year were relatively unimportant. In comparison, the period from 1897 to 1908 was just the reverse: in seven of the eleven years, the ratio was higher in the last quarter of the year. (Kemmerer also had found that U.S. deposits in the last three months at that time were generally higher than those in the first nine months.) The amount of change in the ratio over the year was also considerably higher than it was before 1897. From 1909 to 1914 it renewed its earlier erratic behavior, though its variations again became fairly small. Notwithstanding that lapse, the year 1897 marked a clear change in the seasonal movement of U.S. deposits at banks, small and irregular before that year and, thereafter, larger and usually upward during each calendar year.

As for the importance of Treasury policy to the long-run level of the reserve ratio, perhaps a better indication than seasonal movements is cyclical movements in U.S. deposits. Banks might have been able to eliminate part of the seasonal increase in their usable reserve ratios during the spring and summer months because of stabilizing variations in U.S. deposits, but they would still have needed sizable reserves during cyclical expansions to prepare for the stringencies which often develop midway through cyclical contractions. Only if the Treasury supplied funds in contractions and withdrew them in expansions might banks dispense with much of their usable reserves. The correspondence

[40] Edwin W. Kemmerer, *Seasonal Variations in the Relative Demand for Money and Capital in the United States* (61st Cong., 2d Sess., S. Doc. 588), National Monetary Commission, 1910, p. 159. Treasury deposits were not placed at nonnational banks until 1917.

of Treasury actions to such a policy is shown in Table 26. In the late 1890's, cyclical movements in U.S. deposits began systematically to alleviate the normal pattern of stringencies by providing more funds in contractions than in expansions.

As column 3 demonstrates, by comparing the level during contractions with the average level during the preceding and succeeding expansions, the contribution of U.S. deposits to monetary stability changed

TABLE 26

RATIO OF U.S. TO INDIVIDUAL DEPOSITS AT NATIONAL BANKS: AVERAGE
DURING REFERENCE EXPANSIONS AND CONTRACTIONS, 1873-1918
(per cent)

Peaks of Reference Cycles	Contractions (1)	Expansions (2)	Contractions Minus Average of Preceding and Succeeding Expansions (3)
Oct. 1873–Mar. 1882		0.9[a]	
Mar. 1882–Mar. 1887	1.0	1.1	0.0
Mar. 1887–July 1890	2.7	2.9	0.7
July 1890–Jan. 1893	1.6	0.8	-0.3
Jan. 1893–Dec. 1895	0.6	0.8	-0.2
Dec. 1895–June 1899	0.9	2.3	-0.7
June 1899–Sept.1902	3.6	3.5	0.7
Sept.1902–May 1907	4.4	2.4	1.4
May 1907–Jan. 1910	4.5	1.6	2.5
Jan. 1910–Jan. 1913	0.7	0.7	-0.4
Jan. 1913–Aug. 1918	1.0		

Note: Ratios shown are unweighted averages of ratios for call dates falling within reference expansions and contractions (Annual Report of the Comptroller of the Currency).

[a]Excludes first two call dates of the expansion phase for which the ratio was abnormally high, because of Treasury refunding operations.

dramatically in the late 1890's. That behavior shows up in Chart 6 in a rise from reference expansions to contractions in the nongold source of changes in high-powered money, greater from 1897 to 1908 than the corresponding rise in the contribution of the gold stock; that is, the ratio of high-powered money to the gold stock rose.[41] (We may also note that Treasury operations shown in Chart 6 were considerably less erratic after 1897 than before.) The actual contribution of Treasury operations to banks' usable reserves was even greater than it was to high-powered

[41] The nongold source also rose during the contractionary phase of the 1894–97 reference cycle, but the significance of the rise is obscured by the upsurge in gold inflows which started at the same time.

money, because the funds were deposited directly in banks. When such funds are used to buy bonds from the public, instead (as in open market operations of Federal Reserve Banks), the operation also increases the public's cash balances, but only part of the increase is deposited at banks and is subject to reserve requirements. The currency-money ratio indicates the fraction eventually held as currency. When the Treasury deposits funds directly in banks, the whole supplements usable reserves except what is deducted for required reserves. After October 1902, when reserves behind U.S. deposits were no longer required, all deposits supplemented usable reserves.[42]

The percentages in Table 26 are approximately equal to the changes in the total reserve ratio produced by Treasury operations. The changes of 1 to 3 percentage points may not seem very important, but their effect may have been greater than these figures indicate, for two reasons. First, most of the changes applied only to New York City banks, which held about one-fifth of individual deposits in all national banks. Hence the effect on the reserve ratio of New York City banks could have been as much as 5 times greater than the amount shown. Table 25 shows that most of the long-run decline in the level of the usable reserve ratio of central reserve city national banks occurred simultaneously with that change in Treasury policy. Second, the change in policy superseded former actions that were a source of cyclical instability in bank reserves. Column 3 of Table 26 shows that the Treasury reduced the reserve ratio by 0.7 percentage points in the contraction following the 1895 peak and increased it by 2.5 points in the contraction a decade later following the 1907 peak. The difference of over 3 points provides a crude measure of the net gain to usable reserve ratios, though the gain was less in other contractions. National banks actually reduced their usable reserve ratios almost 4 points, on the average, from the late 1890's to 1907. While the pattern of U.S. deposits in the 1910–13 period was moderately procyclical, financial conditions never degenerated to the point where banks needed much

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[42] Around 1900, the required reserve ratio for all national banks was roughly 15 per cent and the currency ratio roughly 17 per cent. A dollar of high-powered money added to the public's cash balances therefore increased usable reserves by $(1 - 0.17) $(1 - 0.15)$, or $0.71. A dollar deposited directly in national banks by the Treasury increased usable reserves by $(1 - 0.15)$, which exceeds the increase of the other method by $[(1 - 0.15)/(1 - 0.17)(1 - 0.15)] - 1$, or 20 per cent. After reserve requirements against U.S. deposits were removed in 1902, the second method exceeded the other by $[1/(1 - 0.17)(1 - 0.15)] - 1$, or 41 per cent.

outside help, and there was no reason to believe the Treasury did not remain ready to provide substantial help if needed. We may conclude, therefore, that the Treasury's new policy after 1897 contributed reserves up to about three-fourths of the subsequent reduction in the usable reserve ratio. The actual contribution may have been larger or smaller, depending on the confidence of banks in the Treasury's ability and willingness to pursue its self-appointed role as central banker. The related timing of the events just rehearsed suggests that confidence was strong or, at any rate, strong enough to sweep away the prior reluctance of banks to sacrifice the safety of large usable reserves for increased earnings from their investment. From the banks' point of view, the Federal Reserve Act confirmed a policy the Treasury had already inaugurated more than a decade before.

Although the change in Treasury policy probably explains most of the long-run decline in the reserve ratio after 1897, it seems unlikely to explain much of the decline in the national bank reserve ratio from 1887 to 1890 (Table 25). The improvement in the Treasury's handling of its funds in the eighties was short lived (Table 26); yet the reserve ratio for all national banks declined (except in the difficult 1892–95 period).[43] It is not possible, therefore, to attribute the early decline to Treasury actions. That decline can be attributed to the over-all improvement in the stability of the monetary system.

It might be argued that the long-run decline in the usable reserve ratio after 1897 coincided with increases in the rate of growth of high-powered money, not accounted for by Treasury operations, and that the prospect of rising future reserves led banks to reduce present usable reserves. They might also have relied on the continued expansion of the credit base to take care of possible temporary stringencies. The year 1897 marked the end of the protracted deflation which had gripped the country since the end of the Civil War. Huge gold inflows in 1896 and subsequent years heralded a major reversal of trend, as we saw in Chapter 3. From the depression years of 1893–97,

[43] The *Commercial and Financial Chronicle*, however, did attribute most of the early decline to Treasury operations. In 1890 it deplored the following alleged practice: "The time was when our banks provided beforehand for the fall trade, and so trimmed their sails, if we may be permitted to use the expression, through the summer months as to avert a storm, by preparing themselves for the crop demand. Of late years they have looked to the Treasury wholly, and have gone through the summer trenching on their reserves regardless of any increased drain sure to come later." (Dec. 6, 1890, p. 764; quotation also in Kemmerer, *Seasonal Variations*.)

money and prices started to rise sharply, and a wave of prosperity spread across the country in vivid contrast to the preceding years. That turn in the business and financial outlook surely made a big difference to banks and might have led them to work down their usable reserves. It allowed the Treasury to engage in long-desired operations, previously impossible.

The latter part of the 1890's is an example of those decisive—and, for the historian, exasperating—periods when so many things happened all at once. Yet other relationships that might be proposed to explain the decline in the reserve ratio then do not hold consistently at other times. There is little relation over the long run between changes in the usable reserve ratio and the rate of growth of high-powered money; the ratio fell a few times when the rate rose but in general did not rise when the rate fell. Other financial developments due to improved business conditions after 1897 might have affected the speed with which banks adjusted the level of the reserve ratio, but much less the long-run desired level.

In conclusion: The explanation for the downward trend in the usable reserve ratio which seems most consistent with the data, therefore, is the greater stability of the monetary system produced during and after the Civil War by increased state and federal regulation of banking, after 1897 by the assumption of central banking functions by the Treasury, after 1914 by the Federal Reserve Banks, and after 1934 by federal deposit insurance.

4. Cyclical Movements

In addition to a secular decline, the reserve ratio displays short-run cyclical fluctuations, not explained by shifts in deposits and changes in reserve requirements. Since the total ratio is affected by changes in requirements and shifts in deposits, over which individual banks have no control, the usable reserve ratio would be preferable for cyclical analysis, but a series on usable reserves is not available for all commercial banks. The preceding examination of changes in reserve requirements helps us to allow for their major effects. The reference cycle patterns of the total reserve ratio, plotted in Chart 21, show the level of the series, not its contribution to the rate of change in the money stock as in Chart 2.

CHART 21

Reference Cycle Patterns of the Reserve Ratio of All Commercial Banks,
1879–1954
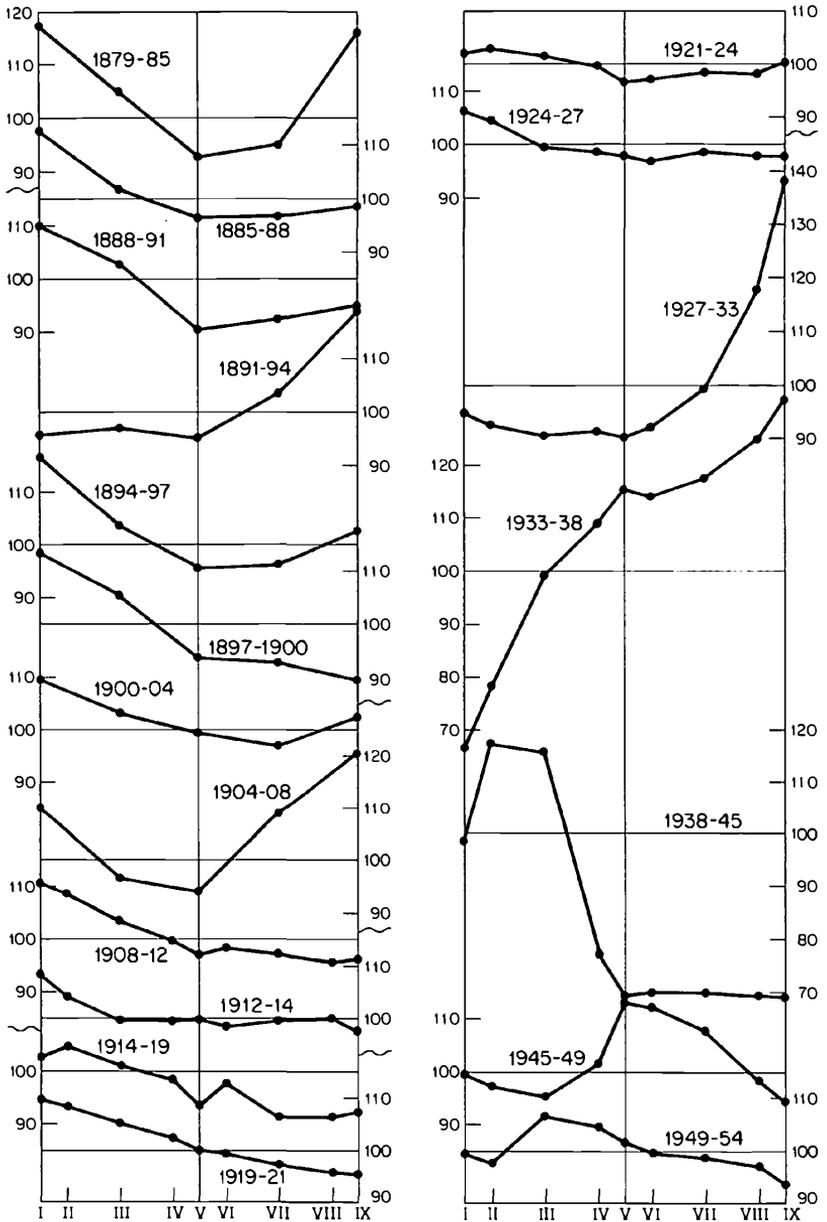
Source: Same as for Chart 2 and Table F-1.

Note: For annual data before 1908, stages II, IV, VI, and VIII are omitted, and some of the standings for stages III and VII are based on interpolations.

The reference cycle patterns show a high inverse conformity of the reserve ratio to business cycles. The ratio generally declined during business expansions (stages I to V) and either leveled off or rose during business contractions (stages V to IX). The major turning or inflection point in the patterns usually coincided with the peaks and troughs of reference cycles. That the amount of decline during expansions usually exceeded the amount of rise during contractions reflects the downward trend of the ratio.

The chart shows movements during similar stages of different cycles. Because the actual time covered by the different cycles varies, the impact on the economy of a given change in the reserve ratio, and thereby in the money stock, depends on how fast the change occurs. It is appropriate to look also at changes in the ratio per time period. The average change per month in the relative reference cycle standing of the ratio during reference expansions and contractions is presented in Table 27. The average change per month for contractions minus that for the preceding expansion, shown in the last column, is uniformly positive except for the two post-World War II cycles—that is, the rate of change in the ratio generally rises more or falls less in contractions than in the preceding expansions. This supports the visual impression from Chart 21 that movements in the ratio conform closely to reference cycles. Moreover, the two cases of nonconformity can be attributed to the effects of changes in reserve requirements. Member bank requirements were raised during the expansionary phases of the 1945–49 and 1949–54 cycles and lowered during the contractionary phases (Table 21). These changes in requirements largely account for the concurrent variations in the total ratio. The usable ratio for member banks shows little change from stage I to stage V and from V to IX in these cycles (Chart 20). The other major changes in member bank requirements either worked to enhance the inverse conformity of the patterns to reference cycles or to reduce but not eliminate it. If adjusted for changes in reserve requirements, therefore, the reserve ratio would uniformly display inverse conformity to business cycles.

Although conforming closely to cycles, the short-run fluctuations have varied greatly in amplitude. The large increases during reference contractions appear to be associated with financial disturbances and deep depressions. To confirm such an association, averages of the

TABLE 27

CHANGES IN THE RESERVE RATIO DURING REFERENCE CYCLES, 1879-1954

Reference Cycle Dates[a] Trough, Peak, Trough	Special Cycles[b]	Average Change per Month of Reference Cycle Relatives During:		Difference Between Average Change per Month of Relatives for Reference Contraction and Preceding Expansion
		Reference Expansion (1)	Reference Contraction (2)	(2) - (1) (3)
ANNUAL DATA[c]				
Mar.'79 Mar.'82 May '85	ps	-0.67	0.61	1.28
May '85 Mar.'87 Apr.'88		-0.75	0.18	0.93
Apr.'88 July'90 May '91	p	-0.73	0.46	1.19
May '91 Jan.'93 June'94	ps	-0.02	1.40	1.42
June'94 Dec.'95 June'97		-1.17	0.39	1.56
June'97 June'99 Dec.'00		-0.82	-0.22	0.60
Dec.'00 Sept.'02Aug.'04		-0.49	0.14	0.63
Aug.'04 May '07 June'08	ps	-0.48	2.03	2.51
MONTHLY DATA				
June'08 Jan.'10 Jan.'12		-0.71	-0.03	0.68
Jan.'12 Jan.'13 Dec.'14	p	-0.71	-0.10	0.61
Dec.'14 Aug.'18 Apr.'19		-0.21	-0.15	0.06
Apr.'19 Jan.'20 Sept.'21	s	-1.07	-0.24	0.83
Sept.'21May '23 July'24		-0.26	0.24	0.50
July'24 Oct.'26 Dec.'27		-0.30	0.01	0.31
Dec.'27 June'29 Mar.'33	ps	-0.25	1.07	1.32
Mar.'33 May '37 May '38	s	0.98	1.40	0.42
May '38 Feb.'45 Oct.'45		-0.36	-0.02	0.34
Oct.'45 Nov.'48 Oct.'49		0.37	-1.71	-2.08
Oct.'49 July'53 Aug.'54		0.05	-0.60	-0.65
Averages				
6 panic cycles			0.91	1.39
6 severe cycles			1.04	1.30
11 nonpanic and nonsevere cycles			-0.16	0.26
9 nonpanic and nonsevere cycles, excluding 1945-54 cycles			0.05	0.62

Note: The ratio here is the ratio of high-powered reserves to deposits of the public at all commercial banks, as in Chart 21.

[a]Some slight revisions in these dates, made since this table was computed, would not change the figures significantly.

[b]p = panic cycles, so designated because payments were suspended or Clearing House loan certificates were issued by New York City banks, as in Table 14.
s = six most severe nonwar contractions, as judged by the percentage decline in aggregate output (see Table 1).
While there is no sharp dividing line between severe and moderate contractions, slight changes in the designations do not greatly affect the averages at the bottom of the table. For example, if the severest of the moderate contractions from 1879 to 1954, that of 1895-97, is shifted to the severe-cycle group. the three affected averages for cols. 2 and 3 are:

Averages	(2)	(3)
7 most severe cycles	0.95	1.33
10 nonpanic and nonsevere cycles	-0.22	0.13
8 nonpanic and nonsevere cycles, excluding 1945-54 cycles	0.22	0.51

The war cycles are not separated here unlike the analysis of high-powered money and the currency ratio, where there is strong reason to exclude them as atypical.

[c]Semiannual data 1879-81; monthly data beginning May 1907.

measures in columns 2 and 3 of Table 27 are shown for three groups: six most severe cycles, as judged by the percentage decline during reference contractions in aggregate output; panic cycles in which payments were suspended or New York City banks resorted to Clearing House loan certificates to ease a currency shortage; and all other cycles.

The averages for panic and severe cycles are much higher than the average for all other cycles,[44] even when we exclude from the mild cycles the two post-World War II contractions, in which the usual pattern was reversed by the effects of changes in reserve requirements. The ratio appears to react sharply to financial panics and severe contractions. Whether both are of equal importance cannot be readily judged from these figures, since the averages for the two groups contain practically the same cycles.

We may assess their separate effects by looking at cycles in which only one occurred. There are four: 1888–91 and 1912–14, which had panics but were not severe; and 1919–21 and 1933–38, which were severe but did not have panics. Unfortunately, two of these cycles, 1912–14 and 1933–38, provide little evidence on the separate effects of panics and severe contractions and must be discarded. The panic of 1914, as noted in Chapter 4, was a rather mild affair, thanks to the ability of national banks to make emergency issues of national bank notes under the Aldrich-Vreeland Act of 1908. Before that, issue of scrip currency was really illegal, and clearing houses undoubtedly resorted to its issue at a later point in panics and in smaller quantities than desirable. When the outbreak of war in 1914 touched off a financial panic, the special notes were issued quickly and freely. (The Federal Reserve Banks were not yet organized and so could not make loans.) With that new source of currency on hand, it was to be expected that banks would face the panic with unaccustomed calmness. As evident in the reference cycle pattern of the reserve ratio for the cycle ending in 1914, banks did not contract appreciably, a suspension of payments did not occur, and the panic subsided quickly. The cycle never developed the repercussions that would be expected from large unsatisfied increases in the demand for currency. It offers

[44] Amplitude measures like those in Table 27 are smaller for annual than for monthly data. The table therefore tends to understate the average for the panic cycles more than for the other groups, since four of the six panic cycles occurred before 1908 and are measured with annual data.

no proof, therefore, that ordinary panics do not affect the ratio. During the 1933–38 cycle the ratio was affected by changes in require- ments. The behavior of other financial institutions, discussed earlier, suggests that the reserve ratio for commercial banks would have remained more or less constant had requirements not increased, and therefore that the severity of the business decline itself had no effect. Be that as it may, that cycle cannot be cited as reliable evidence for the importance of severe contractions.

When those two cycles are omitted, there remain only two, 1888–91 and 1919–21, to show the separate effects of panics and severe con- tractions on the reserve ratio. They will have to serve as the basis for a tentative hypothesis. They indicate that panics produce a sharp rise in the reserve ratio but severe contractions in business do not. In the 1890–91 contraction, not severe but with a panic, there was a sizable rate of rise in the ratio. According to column 2 of Table 27, the rate of rise was larger than in any of the mild cycles and was exceeded only by rises in the other panic cycles except 1912–14 and 1937–38, which should be omitted. In the 1920–21 contraction— severe but without a panic—the ratio actually declined, though at a slightly slower rate than in the preceding expansion, a pattern char- acteristic of its behavior in mild contractions. The measure of over-all cyclical variation in column 3 for that cycle is only a little above the average for the mild cycles. The clear implication is that panics have an important effect on the ratio and that severe business contractions, per se, do not.

Why panics are important is not hard to understand. Such a dis- turbance threatens the solvency of banks, and they respond by cur- tailing operations sharply. Every effort is made to bolster cash reserves, not only to meet heavy withdrawals but also to attain sufficient liquidity to allay depositors' suspicions of financial weakness. The banking system can honor only a small fraction of its demand liabilities at one time, and the more deposits it is asked to redeem, the weaker its position becomes. The first rule of banking practice is to instill confidence and avoid a thorough test of the basis for that confidence. Great efforts to obtain ample cash reserves are therefore to be expected when financial markets become disturbed.

Appraised by hindsight, those efforts do not produce substantial results until the panic is over and large reserves are no longer needed.

Panics are a harrowing experience which apparently leave a residue of caution for some time even with bankers who survive it. The post-panic increases in the reserve ratio may have gone higher, however, than most banks desired, owing to a heavy inflow of currency (and in the earlier period, gold from abroad) just when the demand for loans became quite low.

There are two reasons why a severe contraction alone might be expected to produce a sizable rise in the reserve ratio: A sharp down-turn in economic activity, while it does not of itself threaten the sol-vency of banks, does produce a sharp fall in the demand for loans and so in the rate of interest. Banks might also hesitate to commit a large fraction of their portfolios to bonds at low rates of return and might prefer to hold some of their funds idle. The evidence as a whole suggests that effects of these factors on the reserve ratio are far less important than effects of panics are.

If the foregoing interpretation is correct, it is to be expected that a panic would usually be followed by a severe contraction. Financial panics cause large increases in the reserve and currency ratios. The result is a substantial reduction in the money stock unless the increases are offset by increases in high-powered money. As the analysis of Chapter 2 shows, such changes in high-powered money have usually not occurred. Panics produce a sharp contraction in the money stock, therefore, and this wrenches the credit structure of the whole economy and disrupts commerce. The two nonsevere panic cycles, 1888–91 and 1912–14, did not have such effects on the money stock and so are not exceptions to the importance of those effects. In the 1890–91 con-traction the increase in the reserve ratio was not accompanied by a sharp rise in the currency ratio (the panic was largely confined to New York City, and a general suspension of payments did not occur) and was partly offset by increases in high-powered money. The 1914 panic did not initiate the customary rise in the reserve ratio. All other panics since 1873 have been accompanied by severe business de-pressions. Of these, only the 1884 crisis did not involve a suspension of payments, but the rise in the reserve ratio was nonetheless still appreciable. The paucity of evidence—few severe contractions and panics not occurring together—indirectly supports the foregoing interpretation.

The argument cannot be turned around to plead the importance

of severe contractions as a cause of panics and hence of the reduction in the money stock, because the panics were not caused by a low level of business activity. This much can be said even though we cannot specify the actual causes. Panics are a strange phenomenon, not readily explained in any satisfactory way except by reciting the particular series of events setting off each one. They are often described as chain reactions going from worsening expectations to mass hysteria. But there is nothing irrational about the behavior of each individual in a panic; if a bank is subject to a run, there is no point in being the last person in line. The difficulty is in specifying the precise conditions in which a run starts and keeps going. Certain contributory factors can be identified. Panics were more frequent before 1914 owing to the pre-World War I banking system with its inverted pyramid of credit resting on New York City banks and absence of emergency reserves provided by a central bank—though the worst panic came under the Federal Reserve System. Panics have usually developed in the early stages of cyclical downturns (1933 is the most dramatic exception), when the usable reserve ratio was comparatively low. No doubt the accompanying downturn in business activity set the stage but was not alone the cause. Banks were typically vulnerable to a rise in the currency ratio or a gold outflow at such times, yet only because of some series of shocks to confidence did the public panic. Banks were not much tighter before panics than at many other reference peaks. In their time sequence, panics have not been spontaneous but have been sparked by failure of a few large financial companies, often involving fraud or mismanagement frequently brought to light but hardly caused by the business downturn. In any event, it is impossible to associate most panics with the severity of a business contraction since they typically arose early in the downturn.

There is no reason a severe contraction could not occur without a large increase in the reserve ratio and so without a panic. Large increases in the reserve and currency ratios, which are characteristic of panics, are not always responsible for the relation (Table 1) between the amplitude of decline in the rate of change of the money stock and the amplitude of the subsequent decline in economic activity. A large decline in the growth of high-powered money could account and sometimes has accounted for the relation. To be sure, a sufficiently drastic decline might endanger the liquidity of the banking system

and so precipitate a panic. This could explain why so many more panics occurred before 1914 than after: before 1914, sharp outflows of gold sometimes forced banks to contract credit too fast; after 1914, Federal Reserve Banks could offset such outflows, at least temporarily, by an expansion of their credit. A decline in the growth of high-powered money need not have this effect, however, and the 1921 contraction is a notable example. Federal Reserve Banks contracted credit in 1921 to liquidate their "overextended" position following the wartime expansion. The reduction did not proceed faster than member banks were able to contract loans, and the solvency of the banking system was not endangered. Such a large reduction in high-powered money, though it has rarely occurred without producing a liquidity crisis, nevertheless suggests that a panic, not the resulting collapse of economic activity, leads banks to scramble for cash.

The reference contractions containing the panics of 1884 and 1933 might seem to support the importance of severe business declines for large increases in the reserve ratio, since those panics came late in the contractions. Yet, these contractions support the opposite conclusion, if anything. Chart 21 shows that the steep rise in the reserve ratio during the two cycles came, not immediately after the reference peak, but later. In the 1882–85 contraction the ratio rose most rapidly in the second half and, so far as the annual data show, after the panic. In the 1929–33 contraction it rose most rapidly in stages VIII and IX, after the breakdown of the banking system had started, though the panic did not come until stage IX. That disaster was imminent for some time before the authorities declared a banking holiday, as indicated by the rise in the currency ratio and the high incidence of bank failures before the suspension of payments in March 1933.

In summary: A financial panic reflects a deterioration of public confidence in banks, owing principally perhaps to their precarious reserve position. It is caused by a variety of factors, of which a severe decline in economic activity by no means appears to be the only or even an important one. A panic impairs the solvency of banks, which contract credit drastically in an effort to raise the reserve ratio. The contraction of credit in turn has deflationary effects on the economy which aggravate the decline in output. Panics have not precipitated cyclical downturns; all of them cited here have followed peaks in economic activity. Many panics have also come during the first half

of contractions, too early to be the result solely of a severe decline in economic activity, and so were, to a large extent, independent factors aggravating the decline.

Apart from panic cycles, fluctuations in the reserve ratio conform also to mild reference cycles, though the amplitude of fluctuation in such cycles is fairly small. The ratio rose slightly or had a lower rate of decline in all mild reference contractions except those in which new reserve requirements were imposed. Chart 21 shows that the rate of decline in the ratio usually falls midway through reference expansions as well. Consequently, in mild cycles the ratio plays a role in form-ing the specific cycle peak in the rate of change of the money stock (Chart 2), which precedes the peak in business activity. That the decline in the reserve ratio during reference expansions is arrested well before the peak in business activity suggests that banks try to prevent the usable reserve ratio from falling below some minimum level, although the minimum is subject to secular changes. The existence of such a minimum would explain why the fall of the ratio is not continuous throughout reference expansions but stops before the peak, even though business prospects remain bright. What is not clear, however, is why the usable reserve ratio rises above the minimum during business recessions.

One might expect the rise to reflect a decline in interest rates. If a panic occurs in the early stages of a recession, of course, interest rates first rise sharply. As the recession deepens, however, a decline in the demand for capital tends to outweigh public preferences for liquidity, and rates on borrowed funds fall. The fall, making cash reserves more attractive to banks, might explain the rise or reduced rate of decline in the reserve ratio during contractions. The a priori plausibility of such a relationship tells us nothing about its actual importance, however.

Secular movements in the ratio are inconsistent with that relation-ship (Section 3). The usable reserve ratio of national or member banks fluctuated about the same level, or possibly a slightly declining one, from 1875 to around the turn of the century; bond yields declined during that period, whereas the postulated relationship requires inverse movements. Although short-term rates rose after 1896 and the ratio fell, the rise in rates was no more than the decline during the 1890's. Bond yields fell until 1902 and then rose until 1920, while

the ratio fluctuated about the same level from 1902 until 1914. After a moderate rise during World War I, the usable ratio slowly fell during the 1920's to a lower level than ever reached before, while bond yields were declining. For the whole period from 1875 to 1930, the only evidence of inverse movements is the short period 1896–1902—for short-term rates only; otherwise the correlation either is nonexistent or has the wrong sign. Unlike bond yields, short-term interest rates, such as commercial paper rates, did not have a clear-cut secular trend up to 1930 except possibly a sharp fall during the 1870's and so cannot explain secular movements in the reserve ratio before 1930.

During World War II, the usable reserve ratio fell sharply, well before interest rates reached a long-run trough in 1946. The ratio then fluctuated about the same level until 1950 and declined only slightly thereafter, while interest rates registered one of the sharpest increases on record. The 1950's may be disregarded, however, since usable reserves were too low to permit a large decline.

Evidence in favor of an inverse relation between interest rates and the usable reserve ratio may be cited for only the 1930's (though our earlier interpretation of this period was entirely different) and possibly for 1896–1902. But there are other factors that can explain those movements, factors of sufficient importance to make the interest-rate relationship relatively minor.

Cyclical movements in the ratio may still reflect interest-rate effects even though secular movements do not. To assess the evidence, let us look at changes in the ratio over reference expansions and contractions. The changes shown in Chart 21 for the total ratio of commercial banks will be adequate for this purpose, though we should allow for important changes in requirements. Chart 22 plots, as a scatter diagram, changes over reference expansions and contractions in the relative standings of the reserve ratio shown in Chart 21 against the corresponding changes for short-term interest rates. The dated phases since the 1929 reference peak include all the extreme points on the diagram.

If the two expansions and two contractions of the 1930's on the edges of the second and third quadrants are deleted, very little negative correlation in the remaining points can be detected, though it is improved if we also delete the other three dated points in the post-World

CHART 22

Scatter Diagram of the Reserve Ratio and Short-Term Interest Rates: Changes in Reference Cycle Relatives over Expansions and Contractions, 1879–1954
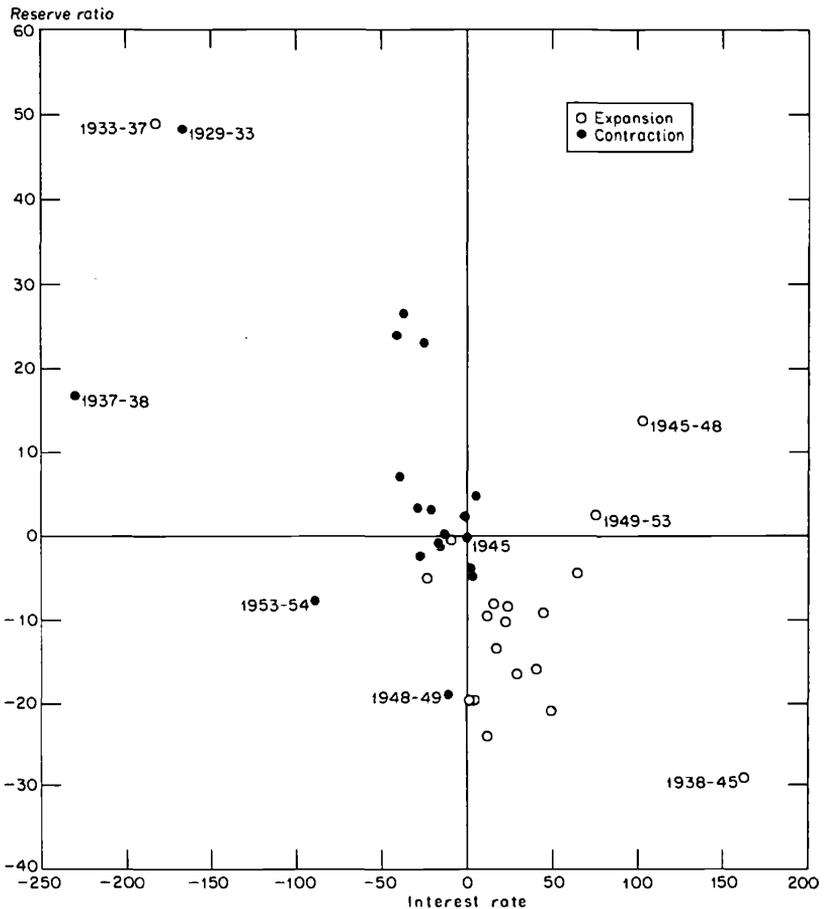
Reserve ratio

Source: Reserve ratio, same as for Chart 21 and Table F-1; interest rate, 1879– 1927, commercial paper rates, and, 1927–54, short-term U.S. securities.

Note: Cyclical phases since 1929 are dated.

War II period. The slight negative correlation in the undated points disappears almost entirely if we treat the expansions and contractions separately. In other words, the undated points are correlated only

because the ratio declined and interest rates rose over reference expansions and vice versa over contractions. This is hardly evidence of dependence, since many series have corresponding movements over reference cycles with no implication that they are directly related to each other. There would have to be a correlation of changes among expansions and also among contractions to support an implication of negative correlation. There is virtually none, except when the 1929–45 phases are included—a special period for which movements in the ratio can be readily explained without interest rates. In a similar diagram of the reserve ratio and bond yields (not shown), deleting just the point for the 1933–37 expansion removes all trace of correlation.

These findings seem out of step with many studies in recent years which allege a close relation between cash holdings and interest rates. Surely bankers would be as sensitive to the costs of holding money as any one, and so their portfolios should exhibit the alleged relation. Supporting evidence can indeed be forced out of the period since 1929; a rough negative correlation does exist if we ignore the timing of movements (a big "if"). As we have seen, the reserve ratio rose during the 1930's and fell thereafter, whereas interest rates fell drastically during the 1930's and then rose after World War II. Laid out on a scatter diagram, annual data for those years provide an attractive negative correlation, but the evidence involves essentially two observations: one movement from 1929 to 1940, and another in the reverse directions in the subsequent period to 1955. All our other evidence suggests that this apparent correlation is fortuitous. The correlation is absent from earlier periods, and the rise in the ratio after 1930 can be interpreted as a response to the 1929–33 financial disaster and to the 1936–37 increases in reserve requirements.

One might argue, of course, that banks became more sensitive to interest rates after the 1920's than they had been previously, though it is hard to see why. The trouble with this argument is the failure of more recent experience to support it. Interest rates rose sharply in the 1949–53 reference expansion and fell just as sharply in the 1953–54 contraction, yet the points for these two phases are far out of line with the others in Chart 22. Although the reserve ratio moved counter to its usual pattern because of changes in member bank requirements,

the usable reserve ratio of member banks (after adjusting to the new requirements) and the total ratio of other commercial banks responded hardly at all to those sharp movements in interest rates.

The only short-run movement that interest rates might explain is the 1938–40 rise in the usable reserve ratio. By 1938, as was indicated earlier, member bank usable reserves had regained their level of 1936 before the 1936–37 increases in requirements. From 1938 to 1940 that ratio, as well as that for other financial institutions presented in Table 22, rose steadily; short-term interest rates dropped to practically zero, and long-term rates fell to historically low levels. With business still depressed, banks and other financial institutions may have considered cash to be as attractive as any alternative asset even though they felt no need to bolster their liquidity position further. On the other hand, banks continued to expand loans and investments, though less rapidly than gold flowed in from abroad. Such high levels of usable reserves have no precedent, not even in the immediately preceding years 1930–37, which do not appear unusual by pre-1900 standards. An effect of exceptionally low short-term rates on the desired reserve ratio cannot be ruled out, though the effect at higher levels appears negligible.

An effect even at such low rates is still questionable, however, since the usable reserve ratio fell rapidly during the early 1940's, while interest rates, as noted, remained at low levels until after 1946. The change in the economic climate with the outbreak of war clearly had a much greater effect on the ratio than the rate of return available on loans and investments had.

The cost of borrowing money may, of course, affect banks' borrowing from Federal Reserve Banks. The preceding evidence concerns the distribution of banks' funds between high-powered reserves and other assets; nothing is implied about the distribution of funds among these other assets—which the rates available no doubt influence—or about changes in total assets through borrowing. There is no reason interest rates cannot be important in one set of decisions and unimportant in another.

Indeed, some studies point to a fairly close relation between Federal Reserve loans to member banks and interest rates (or, more appropriately, the differential rate on Treasury bills over the discount rate). The relation allegedly accounts for part of the variation in the free reserve ratio—that is, the ratio of excess reserves minus borrowings to

deposits.[45] Borrowings produce most of the interest sensitivity of the free reserve ratio; they fluctuate much more over business cycles than total reserves do.[46] These studies are not relevant, therefore, to the relation between interest rates and the total or usable reserve ratio.

We may conclude that cyclical fluctuations in the reserve ratio mainly reflect business conditions, not the cost of holding reserves, insofar as the two differ, as they often do. Apparently banks find their reserves reduced below a comfortable minimum near reference cycle peaks, possibly because they have been loath to deny loan applications by valued customers enjoying prosperity, and take the first opportunity in a business downturn to replenish reserves. The build-up is moderate and does not go far, if currency drains in the absence of a panic are light. The increase exceeds original plans during the ensuing low points of business activity, presumably because loan demands become unexpectedly small.

For these and perhaps other reasons, banks contribute to variations in the rate of growth of the money stock. The reserve ratio displays considerable irregularity, shown in the patterns for individual cycles in Chart 21. There is nevertheless a typical pattern. When business recovers, the reserve ratio begins to decline and apparently continues until the banks' desired minimum level is reached. In the vicinity of that minimum, the rate of decline in the reserve ratio decreases and so contributes to a reduced rate of growth of the money stock. Whether the ratio rises or remains more or less constant until the onset of a reference contraction, it generally rises thereafter and so contributes to a decline in the rate of growth of the money stock. Its average pattern in Chart 2 shows that the reserve ratio played a major part in forming peaks in specific cycles of the money series but a minor one, if any, in forming troughs except in panic cycles.

[45] See, for example, J. J. Polak and W. H. White, "The Effect of Income Expansion on the Quantity of Money," *Staff Papers*, IV., International Monetary Fund, 1954–55, pp. 398–433, Chart 8; and A. J. Meigs, *Free Reserves and the Money Supply*, Chicago University Press, 1962.

There is also a close relation between call money rates and the reserve ratio of New York Clearing House Banks during the pre-1914 period, though the relation is poor for all national banks (See W. M. Persons, "Cyclical Fluctuations of the Ratio of Bank Loans to Deposits, 1867–1924," *Review of Economic Statistics*, Oct. 1924, pp. 260–283).

No studies have separated the effect of interest rates on bank reserves and the effect of reserves and bank credit on interest rates. The observed relation undoubtedly reflects both.

[46] See article in *Monthly Review*, Federal Reserve Bank of New York, Nov. 1958, pp. 162–167.